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ABSTRACT

Increased constraints on access to alcohol resulted from the closure of the sole hotels in two "experimental" towns. This afforded a natural experiment to study the effects of the change in availability of alcohol on consumption. Dependent measures were derived from public records of liquor sales by all licensed premises, and from computerized police records of drunk-driving, criminal offenses, and serious offenses in both the two experimental and four "control" towns. In addition, interview measures of patterns of consumption, the context for drinking, and leisure activities were compared for the two experimental towns and two of the control towns. When comparisons were made to the period before hotel closures or to the control town, the following results were found: (1) a marked reduction in liquor sales; (2) a significant decline in consumption; (3) a change in the pattern of consumption mediated by a change in the context from drinking in hotels to drinking at home, or in clubs; (4) residents engaged in more sporting and outdoor leisure activities; (5) drunk-driving offenses in experimental towns showed a significant decline; and (6) criminal offenses and serious offenses significantly decreased. (Contains 139 references.) (JBJ)

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ALCOHOL AND CHOICE

Kevin W. Kraushaar.

A thesis
submitted for the degree of
Doctor of Philosophy
at the
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Dunedin, New Zealand

February 1992

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For my dearest Rosemary

and family.

ABSTRACT

Increased constraints on access to alcohol resulted from the closure of the sole hotels in two "experimental" towns. This afforded a natural experiment to study the effects of the change in availability of alcohol on consumption. Dependent measures were derived from public records of liquor sales by all licensed premises, and from computerised police records of drink-driving, criminal offences, and serious offences in both experimental and four "control" towns. In addition, interview measures of patterns of consumption, the context for drinking, and leisure activities were compared for the two experimental towns and two control towns. Compared to the period before hotel closures, the closure produced a marked reduction in liquor sales in the experimental towns. Liquor sales in control towns showed a slight increase over the same period. Interview responses revealed a significant decline in consumption by experimental-town residents compared to control-town residents. A change in the pattern of consumption in experimental towns was mediated by a change in the context for drinking from drinking in hotels to drinking at home, or in clubs. Experimental town residents engaged in more sporting and outdoor leisure activities, whereas, control town residents engaged more in drinking-related activities in hotels, discos, and dances. Drink-driving offences in experimental towns also showed a significant decline when compared with the two year period before hotel closures. Criminal offences and serious offences including traffic, property, burglary, drunken and social disorder offences, and total offences per 1,000, significantly decreased in experimental towns compared to control towns. Offences per 1,000 in control towns continued to increase at about the same level as national crime statistics. Changes in the patterns of alcohol consumption in experimental towns, including context-related reduction in consumption, are consistent with an interpretation of alcohol availability and consumption in terms of the behavioral theory of choice.

INTRODUCTION

Attempts to control consumption by controlling alcohol availability are found in historical documents dating back 3,600 years, and such efforts remain at the centre of research today (Single, 1988). The present thesis involved a naturalistic study of reduced alcohol availability due to hotel closures in a rural area of New Zealand. It concerned changes in patterns of consumption, including a context-related reduction in consumption interpreted in terms of the alcohol availability theory and consumption in terms of the behavioral theory of choice.

The costs of alcohol abuse can be separated into personal costs (cancer, liver cirrhosis) and social costs (crime, drink-driving fatalities) to individuals and communities. Personal costs have dominated prohibitionist and disease theories early in the 20th century. More recently, social costs have been the focus of the control of consumption theories, alcohol availability theory, and the behavioral theory of choice. Chapter 1 considers the alcohol availability theory as the current dominant theory of alcohol abuse, and control of consumption approach. It also considers the personal and social hazards of alcohol use and abuse for individuals and communities, and then backgrounds historical approaches in the theoretical and experimental literature to control alcohol consumption. Chapter 2 specifically considers the application of the behavioral theory of choice to the problems of alcohol use and abuse.

Chapter 1

Controls on Consumption

The control of consumption is the central aim of current theories of alcohol abuse. This Chapter considers current and previous theories of the control of alcohol consumption by controlling alcohol availability. I will first discuss the alcohol availability theory as the dominant theory, and outline prior research of the control of consumption theories regarding early studies (1960-1975) that investigated correlations between the personal and social costs of alcohol consumption. Then I consider recent attempts to prevent these costs of alcohol abuse from the primary prevention perspective and the public health perspectives. Finally, I shall briefly review the conclusion of the three other theories to control alcohol consumption that have also manipulated changes in alcohol availability, namely the moral/religious prohibitionist theory, the disease theory, and the responsible drinking theory.

Alcohol Availability Theory

The independent variables of alcohol availability theory include changes in minimum purchase age, the number and density of outlets, changes in price, and hours of sales. The major dependent variable of the alcohol availability theory is alcohol consumption with dependent measures that include the number of traffic crashes[1] and fatalities, liquor sales ($), and hospital admissions etc,.. Figure 1.1 shows the six associations between alcohol availability, per capita consumption, proportion of heavy drinkers, and prevalence of damage.

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[1] The term "crash" has been used instead of traffic accidents because they are not a random unavoidable event but rather have a causal link, often related to alcohol consumption.

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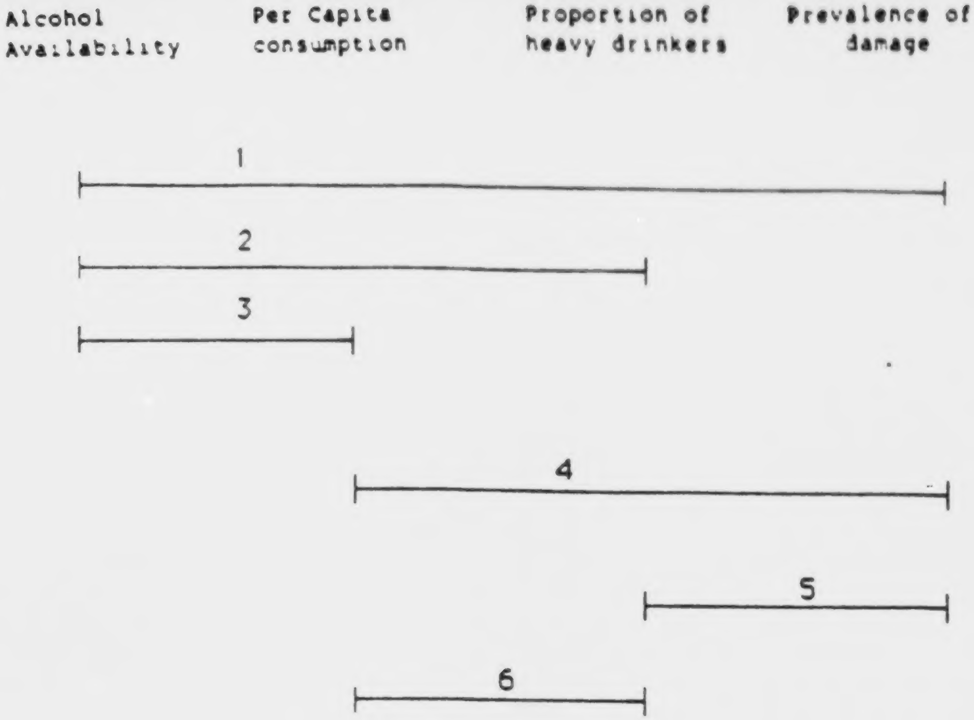
1.1 Six associations between alcohol availability and the Ledermann variables


Alcohol Availability
Per Capita consumption
Proportion of heavy drinkers
Prevalence of damage

Early studies examined the relation between decreased alcohol availability (1) and prevalence of damage (Figure 1.1). The most well documented examples were during the American prohibition experiment and in the United Kingdom during World War I. During these interruptions in alcohol availability both liver cirrhosis and per capita consumption significantly declined (Ravn, 1987). Studies in Australia, Canada, and the United States have shown traffic crashes and fatalities increase following lowering of the minimum purchase age (Bako, MacKenzie, & Smith, 1976; Douglas & Freedman, 1977; Ferreira & Sichman, 1976; Whitehead, Craig, Langford, MacAuthur, Stanton, & Ferrence, 1975; Smith & Burvill, 1986a; Williams, Rich, Zador, & Robertson, 1975). Raising minimum purchase age in American states resulted in a significant decline in crashes and fatalities by young persons aged 18 to 21 years (Wagenaar, 1981ab; Wagenaar, 1982; O'Malley & Wagenaar, 1991). Ravn (1987), was critical of motor vehicle crashes and fatalities studies because they showed "little agreement in scientific literature about the effects of changes upon minimum purchase age" because most were single state comparisons (p. 964). However, the criticisms raised in Ravn's review have been answered more recently by multi-state comparisons in 26 states (Du Mouchel, Williams & Zador, 1987), 10 states (Hoskin, Yalung-Mathews, & Carraro, 1986), and 13 comparable states (O'Malley & Wagenaar, 1991). These studies have shown a significant decrease in traffic crashes and fatalities as a result of reduced alcohol availability when minimum purchase age was raised. Other single state studies report similar results (Wagenaar, 1986; Wagenaar & Maybee, 1986; Lillis, Williams, & Williford, 1987).

Studies of other alcohol availability independent variables include the number and type of outlets and their affects on consumption that been detailed into six headings (Smith, 1983), which I shall briefly review here. (A) Studies of the number of outlets pre-1965 are less useful because they failed to consider the licensing control system of outlets, state monopoly control, and the type of outlets. (B) Six studies examined the introduction of on-premise drinking when off-premise licenses were selling liquor and found no significant change in social alcohol-related costs. (C) The introduction of wine sales in supermarkets and grocery stores increased consumption between 120% and 305% in the first year (Hammond, 1975). (D) In four studies, an increment in the number of off-license outlets showed personal and social alcohol-related costs such as homicides increased, as did per capita consumption, drunkenness, social problems within families, and financial and health costs. (E) Two studies reviewed the social costs following increased on-license premises and reported increased consumption, crime, traffic crashes, and work accidents. (F) Increasing the total number of on-license and off-license outlets (D and E) showed increased consumption, and alcoholic deaths, but control for urbanisation, per capita income, price and minimum purchase age are needed to clarify a simple comparison between social alcohol-related costs and the number of outlets (Smith, 1983).

Recent studies support and recommend as an important primary prevention and public health measure that governments raise minimum purchase age to achieve substantial gains in reducing the death toll of young people (Holder, 1988; Vingilis & De Genova, 1984). Submissions to New Zealand legislators by Alcohol Liquor Advisory Council during the review of the Sale of Liquor Act 1989 (Alcohol Liquor Advisory Council, 1986) have continued these recommendations. Personal submissions to local members of Parliament by the author, and other constituents, to Dr Clive Mathewson, Member of Parliament convinced him and other legislators about the benefits of accident and fatality data to New Zealand's young people by maintaining existing minimum purchase age at 20 (personal communication, Dr Clive Mathewson, Member of Parliament, April 1989; see Appendix A). This association between alcohol availability and prevalence of damage (1) has been discussed first as the strongest association in the alcohol availability theory to date (Figure 1.1).

The association between alcohol availability and the proportion of heavy drinkers (2) considers the effects of price adjustments, or increased taxation on heavy drinkers. As a measure of heavy drinking, when alcohol availability increased cirrhosis of the liver increased, and as liquor prices increased cirrhosis mortality rates decrease (Cook & Tauchen, 1982), and consumption decreases (Holder & Blose, 1987). Reviewers note these findings were not supported by their earlier studies due to poor methodology (MacDonald & Whitehead, 1983; Moskowitz, 1989). However, Moskowitz (1989) concluded that recent evidence showed that not only price changes affect consumption, but increased alcohol availability also increased consumption. Only two studies are cited to support the effective use of price controls to reduce the proportion of heavy drinkers (Ravn, 1987), perhaps because per capita consumption is not a major alcohol availability theory dependent variable.

Researchers have also considered the effects of price controls as an alcohol availability independent measure (3) on per capita consumption (Figure 1.1). Ravn (1987) claimed that econometric price elasticity data does not support the control of consumption by price increases. Beer is generally considered to be price inelastic; that is, beer prices have to increase substantially before a reduction in alcohol consumption is observed. Price changes to wine and spirits show both are elastic; that is, small increases or decreases in price affect their level of consumption. Price controls of wine and spirits may therefore be a more practical solution to effect changes in alcohol availability and consumption. However, alcohol as a commodity is affected by demand for brands or types of beverages. In this instance, conventional statistics that employ a least squares methods of analysis produce biased estimates. But before and after methods measuring price increase or decreases eliminate such bias created by the demand for alcohol (Moskowitz, 1989). One study utilised this approach in 39 States that raised liquor taxes and showed a decline in spirits consumption (Cook, 1981). Nine studies of the effects of price increases on consumption by individuals (not as a control measure) revealed "costs, market value, and the physical effort required to obtain liquor, and temporal distribution all have powerful effects on the total amount consumed" by all drinkers, which includes chronic alcoholics to casual drinkers (Moskowitz, 1989, p. 59).

Control of Consumption Theories

Control of consumption theories are referred to by various names including the single-distribution theory, the distribution of consumption theory, or the constant proportion theory. The last three associations 4, 5 and 6 stand alone, and I shall call them the "Ledermann variables". Several reviewers have made the assumption that the Ledermann variables are part of the alcohol availability theory. But I shall argue this is not so as the alcohol availability theory and its independent variables (minimum purchase age, hours of sale, number and density of outlets, and type of outlets) have very little in common with the Ledermann dependent variables in Figure 1.1 (Ravn, 1987; Rush & Glikman, 1986).

From the 1950's epidemiologists began investigating personal alcohol-related costs (5; Figure 1.1) because heavy drinking appeared correlated with alcohol damage - liver cirrhosis. Jellinek and other disease theory researchers widely used liver cirrhosis as an alcohol-related indicator of heavy drinking. However, critics note that very few heavy drinkers develop liver cirrhosis (Ravn, 1987). In addition, low levels of consumption can result in similar internal damage to the liver, as seen in alcohol dependent populations (Ashley & Rankin, 1988). Reviewers agree that epidemiology studies failed to consider the importance nutrition, pollution, and hazardous chemicals had during the onset of internal damage (Ravn, 1987), and on mortality (Rush & Glikman, 1986). A recent decline in patterns of liver cirrhosis while per capita consumption has remained stable, or increased in Canada and the United States, appears unexplained (Smart & Mann, 1991). The relation between heavy drinking and increased risk of premature death (mortality) has received wider support. Some 200 studies have examined this association between heavy drinking and increased mortality among alcoholics. These studies concluded that the evidence was compelling that chronic alcohol use increases the risk of premature death (Ravn, 1987).

Studies that investigated the relation between average, or per capita consumption and alcohol damage such as alcoholism or problem drinking have been more convincing.

However, epidemiological studies that found an association between per capita consumption and prevalence of internal damage suffer from the same methodology criticisms as above (4; Figure 1.1). Most studies to date have been carried out in Canada and replicable findings of personal damage are often not found in other countries including the Netherlands, and United States (Ravn, 1987). For example, several studies have failed to find an association between drink-driving and per capita consumption (Rush & Glikman, 1986).

The relation between the number of heavy drinkers and their effects on per capita consumption has been studied more widely (6; Figure 1.1). Ledermann, Schmidt, de Lint, and Smart, of the Addiction Research Foundation, Ontario Canada (1956), argued that in most societies only a few heavy drinkers consume a high quantity of alcohol, and consumption was shown as a left skewed distribution indicating a log-normal distribution. Ledermann proposed that this distribution provided an accurate measure of alcohol consumption in any society (Single, 1988). Ledermann was looking for appropriate dependent variables to measure mean consumption by low to high risk drinkers. That is, if one knows the mean consumption by different levels of drinkers, researchers can predict the number of alcoholics in a population. The mean consumption hypothesis was, however, problematic. A major criticism has been that no society meets the Ledermann assumption of homogeneity. That is, light or heavy drinkers in society should not deviate from the overall mean level of consumption (Single, 1988)

More recent studies have criticised Ledermann's log normal distribution (Moskowitz, 1989; Ravn, 1987; Room, 1984; Single, 1988). Moskowitz (1989) noted Ledermann's work has a major deficiency; that is, 50% of alcohol in America was consumed by only 9% of the population. In New Zealand 50% of consumption is consumed by 7% of the population (Ashton & Casswell, 1986). Moreover, Moskowitz noted that mean level of consumption may change but only as drinking practices change "in terms of the social context in which drinking occurs". The "context" for drinking, in particular high-risk drinking environments, is proposed as a dominant factor of increased alcohol consumption (Moskowitz, 1989; Room, 1984; Vuchinich, 1982). Therefore some groups in society can deviate from the mean level of consumption according to the context for drinking. Single observed that different levels of consumption between males and female drinkers are not predicted by Ledermann's log normal distribution. If male and female drinkers' distribution curves were plotted they would yield very different curves. Ledermann's mean hypothesis is therefore untestable.

One positive application from Ledermann's theory was that some personal alcohol-related costs suffered by heavy drinkers may decline if per capita consumption is reduced. In addition, the Ledermann controversy can be credited with first bringing prevention issues into the arena of public debate (Single, 1988). However, even modification of Ledermann's hypothesis is still a matter of controversy (Rush & Glikman, 1986; Single, 1988).

In summary, claims of an association between heavy drinking and causing liver cirrhosis (5) is weakened by reports that both heavy and light drinkers can suffer internal liver damage . In addition, lack of control by epidemiology studies for socioeconomic, personal or social costs weakens some of their major claims. On the other hand the relation between heavy drinking and premature death is compelling. The associations between mean per capita consumption and prevalence of heavy drinkers and related alcohol damage (4 and 6; Figure 1.1) are central to the Ledermann controversy. The epidemiology studies from the Addiction Research Foundation in Ontario, Canada have attempted to confirm these two associations proposed by Ledermann. However, non-Canadian studies have often failed to find as close an association between alcohol consumption and liver cirrhosis, which is a shortcoming (Moskowitz, 1989).

There is compelling evidence that increased and decreased alcohol availability effects drink-driving related traffic crashes and fatalities by young persons. The association between alcohol availability and the proportion of heavy drinkers showed price increases can affect liver cirrhosis mortality rates, and the overall proportion of heavy drinkers. However, the proportion of heavy drinkers is a Ledermann dependent variable and has little application for the alcohol availability theory. The association between alcohol availability and per capita consumption showed that price control for wine and spirits may reduce consumption whereas beer prices would have to increase substantially to gain the same reduction in beer consumption.

It is readily apparent from recent reviews (Moskowitz, 1989; Single, 1988; Holder, 1988; Farrell, 1985) and the use of very different dependent variables that the alcohol availability theory stands alone as a viable theory from which testable hypotheses can be generated without recourse to the Ledermann dependent variables. The independent variables of alcohol availability theory include changes in minimum purchase age, price variations, and the number and type of outlets. The major dependent variable of the alcohol availability theory is alcohol consumption including dependent measures such as motor vehicle crashes and fatalities, and liquor sales. Indeed these dependent measures do not utilise the Ledermann dependent variables of per capita consumption, proportion of heavy drinkers. The alcohol availability theory asks; what are the effects of either decreased or increased alcohol availability (alcohol consumption) on its main dependent measures? Therefore any attempt to connect the alcohol availability theory with Ledermann's log normal distribution would seem incompatible.

Reviewers of the alcohol availability theory detailed the issues and methodology problems for researchers which include: the need for more naturalistic studies of the context of drinking, to identify "age and gender studies of price sensitivity" for alcohol, price inducements such as happy hours, and increased consumption following increased alcohol availability, variables including hours of sales, the location and density of outlets on motorways, and the affect of type of outlets such as grocery stores or retail outlets on alcohol sales. Research methods and design also need to exhibit control for confounding factors by undertaking longitudinal studies with multiple measures to confirm the research hypothesis (Holder, 1988).

Single's (1988) review of neglected areas of research included social factors within contexts for drinking, price incentives, civil liability cases against alcohol providers, and the promotion of alcohol by the brewing industry. He identified five sets of factors that may determine heavy or problem drinking patterns in licensed premises. These included temporal variations, characteristics of the drinking group, the length of stay for each drinking occasion, price differentials, and characteristics of the physical environment. Most context studies have focused on the behavior and drinking patterns of groups or lone drinkers. Single (1988) concluded that drinking behavior and rate of drinking is influenced by a variety of aspects "within" the physical drinking environment and that the context for drinking can affect the rate and amount of alcohol consumed.

Personal and Social Costs of Alcohol Consumption

The control of consumption aims to limit the costs of alcohol abuse. The costs associated with alcohol use and abuse clearly delineate into personal (health), social costs (crime, drink-driving). However, at an international level these costs can be treated as economic costs and short-term benefits. The health costs of drinking include: liver cirrhosis, alcoholism, cancer of the upper alimentary tract, rectum, breasts, pancreas, and liver: pancreatis, hypertension, ischaemic heart disease, alcoholic cardiomyopathy, and cerebovascular disease (Logue, 1986, Popham, Schmidt, & Israelstram, 1975; Smith, 1987; Smith & Burvill, 1990). The effects of alcohol abuse are not confined to health costs. The social costs of drinking include: increased rates of homicide, assault, rape, robbery, burglary, disorderly behavior, domestic violence, drink-driving convictions, suicide and attempted suicide, traffic crashes, and industrial and domestic accidents (White & Moesbergen-Kraushaar, 1989).

However, researchers note that the personal costs of alcohol abuse are often delayed for many years. This is one of the most subtle aspects of the marketing strategies of increased alcohol availability by international and national brewing companies. While financial (tax revenue) and economic rewards (industrialisation) are often immediate the personal and social costs of alcohol abuse are discounted because they are often delayed when individual choice and national policy decisions are made (Vuchinich & Tucker, 1983).

Many drinkers do not perceive the benefits of moderate alcohol consumption (White & Moesbergen-Kraushaar, 1989). Two reviews examined 25 studies detailing various beneficial effects of low to moderate alcohol consumption (Baum-Baicker, 1985; Turner, Bennet, & Hernandez, 1981). Personal beneficial consequences are thought to to be improved nutrition from increased potassium and caloric value, reduced hypertension and coronary heart disease with low alcohol intake, and improved diabetic diet because insulin is not required to metabolise alcohol. Additional reinforcing consequences of alcohol consumption that have been suggested include the reduction of clinical depression (Logue, 1986; Neff & Husaini, 1982; Smith, 1987). However, the costs of alcohol consumption far outweigh the possible benefits.

The central theme of alcohol theories and research has been that individuals and society can control alcohol consumption to reduce the personal and social alcohol-related costs; primarily from alcohol abuse. Current reviews reflect the role both personal and social factors have had in experimental literature. From a historical view personal factors were more dominant in the early 19th century and social factors have increased their dominance during the last two decades. In the last decade, many reviewers of the alcohol literature have focused on a particular perspective including the public health perspective, or the primary prevention perspective. I will briefly review the economic costs and benefits of moderate alcohol use, then review the public health and primary prevention perspectives as they are important in recent alcohol literature because they attempt to intervene to limit the costs of alcohol abuse at political and social levels (Ashley & Rankin, 1988; Moskowitz, 1989; Room, 1984).

The Economic Costs and Benefits of Alcohol Abuse

The cost of alcohol consumption and its consequential effects on the New Zealand health system, including public hospital costs, general practitioner care, pharmaceuticals, teaching and research, and public health activities have been estimated at over $108 million per year (Rayner & Chetwynd, 1987). Public hospital costs alone are estimated at between $52 and $115 million annually (Ashton & Casswell, 1984). In America, alcohol-related damage and costs are staggering; the effects of alcohol abuse alone costs more than New Zealand's gross domestic product. Alcohol-related damage and costs due to alcohol abuse were more than $100 billion in 1983, including over $70 billion from lost productivity and employment, $18 billion due to alcohol deaths, $14 billion in health costs, and $12 billion in property loss and crime (Moskowitz, 1989).

The alcohol beverage industry markets a very popular product (Ashley & Rankin, 1988). In 1980, a group of 27 international corporations had market dominance of worldwide liquor sales (Ashley & Rankin, 1988). In many countries, the alcohol industry has successfully marketed its product. Between 1960 and 1972 beer consumption increased between 49% and 256%, wine sales have increased between 74% and 277%, distilled spirits have increased between 51% and 75% in Asia, Africa, North America, Central America, the USSR, Oceania, Europe (Ashley & Rankin, 1988). In New Zealand estimated per capita consumption has increased by 35% since 1965 (Orchard, 1986). Between 1960 and 1980 per capita consumption of beer increased 15%, wine increased 300%, and Spirits increased 50% (Ashton & Casswell, 1986). In 1985 per capita consumption of total absolute alcohol in Australia (9.4 litres), and New Zealand (9.2 litres) was ranked 13 and 14 respectively among 31 developed nations (Australian Department of Statistics, 1988).

The international corporations' aim to increase alcohol consumption has sometimes had devastating effects on the social, economic, and cultural norms of developing countries (Ashley & Rankin, 1988; Farrell, 1985). Increased alcohol availability in developing countries, with little or no national alcohol policies to prevent personal and social alcohol-related costs, has meant that the industry has faced little resistance to its marketing goals. Alcohol has often been introduced under the guise of free trade agreements for food and other commodities (Farrell, 1985). With international free trade agreements, personal and social alcohol-related problems transfer to developing countries. The rapid increase in alcohol availability challenged cultural values about the undesirability of drunkenness, and damaged the family unit. Farrell (1985) noted the time-lag between increased alcohol availability and when personal and social costs are apparent can be 20 years. In that time brewing and economic interests can be firmly entrenched.

Developing countries, eager to increase industrialisation, have been persuaded by brewing interests of the benefits of increased technology, increased revenue, and as a result committed their cereal agricultural resources for brewing alcohol (Farrell, 1985). For example, Zambia's small economy has committed considerable investment and resources into the long term production of alcoholic beverages. Eleven years after increased alcohol availability, 15% of Zambia's government revenue was from the alcohol industry. Over this period, 50% of Zambia's industrial manufacturing output was related to alcohol revenue. This successful marketing of alcoholic beverage production has been repeated in other countries in Africa, Asia, and the Pacific. In Western Samoa, a small economy in the South Pacific, about 15% of total government revenue was from the sole brewery on the island. India is a notable exception resisting as "morally wasteful the brewing of cereals and other vital foodstuffs to manufacture alcoholic beverages" (Farrell, 1988, p. 7).

The first steps to reverse the tide of transnational marketing strategies were the development of national alcohol policies to reduce personal and social alcohol-related costs.

International health and governmental agencies such as the WHO and the United Nations have vigorously promoted acceptance of national alcohol policy guide-lines. Farrell (1985) reviewed the impact of increased alcohol availability on developed countries to date by considering all the dependent variables of the alcohol availability theory including price and taxation increases, motor vehicle casualties, minimum purchase age, the number of outlets, rationing, prohibition, and the effect of strikes on consumption. For example, between 1966 and 1975 West Indies rum price increases and decreases were negatively correlated with traffic crashes. Thirty American States that increased state taxes on alcohol observed both declining liver cirrhosis, and traffic crashes. During rationing of alcohol supplies in France between 1942 and 1948, cirrhosis deaths declined from 35 to 6 per 100,000. After 1948 cirrhosis deaths rates quickly returned to pre-war levels. Strike studies have given clear evidence of reduced crime statistics in Finland, Poland, and New Zealand. Farrell concluded that all countries should first acknowledge that alcohol is a "drug of dependence and a toxic substance." National alcohol policy guide-lines should be put in place to maintain low levels of alcohol consumption, so governments do not increase the risk of personal (health) and social (crime, drink-driving) alcohol-related costs. Therefore national alcohol policy guide-lines should reduce cultural and family disruption, and the cycle of economic dependence on liquor revenue from increased alcohol consumption.

Public Health and Primary Prevention Perspectives

Both the health and primary prevention perspectives promote the reduction of alcohol-related costs but, aim at different audiences. Reviews from the public health perspective (Ashley & Rankin, 1988; Room, 1984) attempt to challenge "head on" the beverage industry, and politicians, by highlighting the high personal and social health costs found by alcohol damage research. The primary prevention perspective highlights the research regarding assessing community based programmes to limit the costs of alcohol abuse, before it occurs.

Room (1984) traces the historical developments of theories of alcohol abuse, which will be examined below. The imposition of alcohol controls as a public health issue is of interest because Room (1984) focuses on political and ethical conclusions drawn from the literature. However, this political approach has not received unanimous support from alcohol policy makers. As recently as 1983, alcohol policy makers have disagreed with the public health perspective and alcohol availability theorists to increase alcohol controls in order to decrease alcohol abuse because it is "political dynamite" as it would alter the public perception that alcoholism is not a disease (Room, 1984, p. 305). Room (1984) listed nine general conclusions to put alcohol controls in perspective following compelling evidence that alcohol controls can affect consumption, patterns of heavy drinkers, and affect the determinants of personal and social alcohol-related costs.

Civil liability cases have jolted the alcohol industry concerning its responsibility for the personal and social costs of alcohol consumption. In a recent case (Schmidt versus Arlington hotel) in Canada a passenger successfully sued the hotel and driver for $1.3 million dollars after an automobile crash rendered her a quadriplegic (Single, 1988). Evidence from breath and blood alcohol tests show that more than 33% of hotel and tavern patrons are primarily responsible for drinking to excess and drink-driving (Ferrence & Whitehead, 1986). In a national New Zealand survey one in three drinking occasions that exceeded 80 mgs of absolute alcohol occured in licensed hotels/taverns and clubs (Stewart & Casswell, 1986). In many developing countries (Farrell, 1975), and in pacific countries (Casswell, 1986) increased alcohol availability has severely impacted on drink-driving offences.

Room (1984) concluded that prevention policies must use systematic studies of variables related to social alcohol damage such as the context for drinking, or drinking environment to change government policies.

Ashley and Rankin (1988) also reviewed the literature from the public health perspective highlighting the "primacy of prevention." Strategies for prevention were based on a comprehensive review of the alcohol availability variables including economic controls: price or taxation controls, and physical availability (hours of sale, number of outlets, types of outlets, and the legal drinking age). The authors submit that the central focus of prevention strategies should be the promotion of healthier lifestyles. But the root cause of the failure to impact on the costs of alcohol abuse has been the conflict between public policies. As consumption increased the authors noted more treatment services will not necessarily reverse the increasing consequences of alcohol abuse. Research over the last thirty years has provided the basis for identification of primary prevention strategies to affect changes in alcohol abuse (Ashley & Rankin, 1988).

Moskowitz (1989) provided the most comprehensive review of alcohol literature in the last decade. Moskowitz evaluated empirical evidence for the efficacy of prevention programmes. Four types of prevention strategies were examined, (1) policies regarding the number and density of outlets, price and economic availability, and liquor advertising, (2) legal controls, drink-driving laws, (3) primary prevention programmes, and (4) environmental safety measures. Moskowitz addressed these four interventions using five headings of physical, economic, social, multi-variate studies, youth studies, and then summarised each intervention. I shall briefly review the conclusions regarding primary prevention strategies (4 and 5 above) as the strategies 1 and 2 have already been reviewed.

Attempts to control or reduce personal and social alcohol-related damage have included formal drink-driving laws, primary prevention strategies (educational approaches), environmental safety (road designs etc.), and prevention programmes (raised minimum purchase age). Many studies have evaluated primary prevention programmes included those directed at schools, driver education, college programmes, mass media programmes, family prevention programmes, workplace programmes, community programmes, and social programmes (e.g., serving non-alcoholic drinks). Unfortunately, most suffer from methodology defects including inadequate explanation of the reliability or validity of data collected, unsound sample design, misuse of statistical methods, inappropriate analysis of variables, selective interpretation of the results and weak discussion of hypotheses. In addition, epidemiology studies may be entirely inappropriate to measure the effectiveness of prevention programmes. Moskowitz concluded "there was little evidence to support the efficacy of primary prevention programmes." Future direction for research to reduce personal and social alcohol-related cost should examine the impact of the context for drinking, to understand better where intervention should be placed. Shaping social attitudes should aim to communicate the benefits of appropriate drink-driving law enforcement, the alcohol industry agenda, aims of regulatory agencies, norms and behavior in the workplace, homes, family settings, community, and the aims of mass media promotions.

Major directions for the future include research into contexts for drinking, multidisciplinary research into viable primary prevention programmes, the use of taxation to control consumption, increased enforcement of drink-driving laws, motor vehicle safety measures built into vehicles, better generation of hospital emergency data, liquor sales data, and mortality statistics, similar to the FARS (Fatal accident reporting system) to inform policy makers of appropriate control and prevention measures.

In summary, reviews of alcohol studies from a public health perspective concluded that social, economic, political, and beverage industry interests must be challenged to further the aims of primary prevention. The main aim of primary prevention is to decrease the adverse personal and social costs of alcohol abuse. Unfortunately, except for raising the minimum purchase age (an alcohol availability theory independent variable), few effective primary prevention strategies have yet been found.

Theories of Controlling Alcohol Abuse

Previous strategies and conflicts to limit the effects of alcohol abuse have all attempted to control consumption by limiting alcohol availability. The three theories of alcohol abuse that dominate past alcoholism treatment methods and theories of alcohol controls have been extensively reviewed (Ashley & Rankin, 1988; Farrell, 1985; Moskowitz, 1989; Holder, 1988; Smith, 1983; Ravn, 1987; Rush & Glikman, 1986; Room, 1984; Single, 1988). These are (1) moral/religious prohibitionist theory, (2) the disease total abstinence theory, (3) and the integrationist or responsibility drinking theory. I shall briefly review the conclusions of these theories before concentrating in Chapter 2 on the contribution of the behavioral theory of choice to the analysis of alcohol abuse.

1. Moral/religious prohibitionist theory

Temperance movements began in the 1800's with total or regional prohibition eventually enacted in Europe, North America, and even New Zealand. Despite arguments about the success or failure of prohibition, it was apparent that if access to alcohol is constrained, such as the loss of a hotel or saloon, consumption decreases. First, I will be briefly outline the American prohibition experiment, its emergence, effects, decline, and repercussions for today's theories of alcohol use and abuse. Second, I will consider how the American experiment influenced New Zealand's prohibition experiment.

The American Prohibition Experiment

In January 1920 prohibition was enacted in the United States. The temperance movements came from religious/moral backgrounds and their mission was to attack the growing level of drunkenness due to thousands of saloons. In 1810 a former secretary of the treasury calculated per capita consumption by persons 15 years and over as 7 gallons of absolute alcohol (Clark, 1976). By 1829 this figure had increased to 10 gallons of absolute alcohol in spirits. In 1865 spirit consumption was decreasing and beer substituted because brewing technology and chilling methods had improved, allowing easier transportation. Per capita absolute alcohol consumption of beer, spirits and a small amount of wine was 5.6

gallons. Between 1880 and 1886 this per capita figure again increased to 11.4 gallons of absolute alcohol. Clark (1976) considered that by any measure these statistics show a drunken society, especially considering that women and young persons over 15 years of age would have less access to alcohol.

The effects of prohibition are debatable, but several conclusions are agreed upon by writers (Gusfield, 1983).

A. In some geographic regions the effects of prohibition were a success. Urban and rural protestant areas and middle-class areas conformed to the law (c.f., also Clark, 1976). However, in cities with mainly Catholic, and Jewish populations it was supported less.

B. The reduction in drinking was considerable in urban working class areas of all religious beliefs. Prices increased, and the affluent middle-class became the main consumers. Consumption of beer by the working class also decreased because the price of beer increased more than spirits (Gusfield, 1983). A reduction in tax revenues by one third to one-half showed consumption had decreased (Kerr, 1985).

C. Total consumption and deaths from cirrhosis of the liver were lower between 1923 and 1933 than for the decade after repeal (1934 and 1944). Liver cirrhosis deaths were lower during 1923 and 1933 despite a reduction in alcohol consumption during 1934 and 1944 reflecting the effects of reduced spending due to the depression.

New Zealand's Prohibition Experiment

The first prohibition law was enacted by Governor Hobson in 1842 to limit drunkenness by whalers. In 1847 the unavailability of spirits to Maori (native New Zealanders) was enacted to protect them from unscrupulous Europeans who gave them liquor to complete land deals at very low prices. The former law was largely ignored. The latter law remained in force until modern times.

Spirits were the common beverage because beer was unavailable, or highly priced. In the 1860's gold miners were often paid in parts of rum or other spirits. Drunkenness was common. The Temperance and Prohibition union originally began in England during 1830. In 1836 the first fellowship was formed in New Zealand (de la Mare, 1981). Development of the temperance movement in New Zealand was tied in part to developments in America's temperance and prohibition movements. Various temperance movements were formed following visits by American temperance campaigners. The most famous was the Blue Ribbon Army established in 1885 following a visit by an American temperance advocate Richard Booth. That same year a Women's Christian Temperance Movement was formed following the visit by another American Mrs Mary Clement Leavitt. One year later the membership of abstainers had swelled to over 7,000. They were immediately recognised by the large blue sash worn by male abstainers and a white sash by the Women's Christian Temperance Movement. One year later, in 1886, the New Zealand Alliance for the Abolition of the Liquor Traffic was formed. Now their aim was total prohibition, and "the forces of prohibition were amalgamated" (de la Mare, 1981).

By the narrowest of margins and dubious electoral practices New Zealand never passed national prohibition. However, the similarity between New Zealand and American strategies to obtain prohibition was marked. New Zealand prohibitionists aimed to remove licensed hotel bars. The main aim of American prohibitionist was the saloons. Prohibitionists may have had some justification as in some American neighbourhoods beer was cheaper than babies milk (Duis, 1983). Once the possibility of prohibition was apparent, like America, the "moral geography"changed swiftly (Duis, 1983). Pressure for change had been mounting and Parliament amended the licensing Act in 1891 allowing the election of local licensing committees. The prohibitionists quickly sought and gained majority membership on these committees before the local triennial ballot was due. Over the next six years licenses were reduced, then cancelled. Again like America the strong Protestant regions, in southern New Zealand, were the first to vote prohibition. Clutha's first election in 1894 voted 1,642 no license to 487 continence. Ten years later 22 of the 68 licensing

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areas were totally dry or had greatly reduced licenses with sometimes 20 to 30 hotels closed in an area; many in the South Island (de la Mare, 1981).

In 1914 a national ballot was agreed and, but for World War I, national prohibition would have been passed (de la Mare, 1981). Two terms later in 1922 the margin narrowed to 3,362 or (49.004%) of the vote. According to a notable New Zealand politician and antiprohibitionist, John A Lee, multiple voting by brewery workers, or padding the roll, saved the trade (Lee, 1975). Only after the loss did the prohibitionists realise that brewery workers had been paid to take up temporary vacancies as polling clerks to count the votes (Lee, 1975).

In America the association between the anti-saloon league and the churches was weakening. The support base of the anti-saloon league was crumbling due to internal politics and personality conflicts (Duis, 1983). This hampered international coordinating efforts and cost New Zealand prohibitionists a victory in the 1925 election (Duis, 1983, p. 250).

After the 1925 election, the prohibition vote fell away, especially as the breweries amalgamated as large business; Lion Breweries, now a dominant transnational company in Australasia, was formed. Local control of licensing had established prohibition in New Zealand, and like the state by state strategy in America, prohibition was dismantled across regions. Local licensing control is still in place today with the introduction of Licensing Trusts and continuation of local liquor licensing authorities in the Sale of Liquor Act 1989. Some southern areas voted for local Licensing Trusts instead of brewery owned licenses with the profits from Trust owned hotels and taverns going back into the community. Trust areas abound with more community based facilities including heated swimming pools, high quality sports facilities, and the charitable support of community projects that non-Trust areas do not enjoy. If a new vanguard should arise, then it should be the Licensing Trust with profits going back into poor rural communities. In addition, social policies including financial support for the treatment of local persons suffering personal and social alcohol-related costs, and funding of local alcohol research initiatives could be written into Trust charters.

From a temperance movement perspective, prohibition removed saloons from the landscape. Consumption had decreased significantly. Repeal was probably due to internal politics, organisational, and religious and sectarian problems inside the anti-saloon league (Kerr, 1985; Clark, 1976). In addition, the economic influence of brewing interests, and the U.S. government's reliance on alcohol taxation revenues was evident in many local and state wide economies (Farrell, 1985). The loss of tax revenue during the depression, and loss of employment opportunities following the enactment of prohibition was felt at local levels and contributed to the repeal of prohibition (Kerr, 1985). However, "prohibition is not a historical anachronism" (Single, 1988, p.277) as many millions of peoples in Moslem countries, several States in India, and regions in Western nations (e.g., Canada) prohibit the sale of liquor today.

The Disease Theory

After prohibition the churches, and many researchers, emphasised that the product was not at fault. Rather the problem was with the consumer. Concern shifted to a small population of alcohol consumers who suffer the extreme personal and social costs of alcohol abuse. Ashley & Rankin (1988) called the transition to the disease theory as a "shift from a bad substance alcohol" (i.e, prohibition and temperance movements), "to bad users, or alcoholics" (i.e., disease theory). Five reasons have been suggested for the general acceptance by society of the disease theory. First, the disease theory is accepted most widely by commercial interest because it conveniently circumvents personal and social costs of promoting alcohol use. The beverage industry promotes the view that alcohol abuse is an individual problem and spends millions (NZ$12.4 in 1985) advertising images of alcohol consumption as attractive, acceptable and rewarding (Casswell & Martin, 1986). Second, alcohol users' attitudes reflect the acceptance of the disease theory as many people do not exhibit as suffering personal or social alcohol-related costs. Drinkers who have problems with alcohol must be diseased. That is, drinkers with problems are a product of a biological predisposing condition, as many persons drink without identification as problem drinkers (Ashley & Rankin, 1988). From a clinical perspective, lack of identification of problem drinkers may be due to the high miss rate by screening tests (Clark & Saunders, 1988). Many clinicians would submit that many problem drinkers do not present themselves to treatment agencies until far too late when lifestyles have to be drastically changed. Third, Alcoholics Anonymous (A.A.) strongly support the disease theory in every community, requiring personal disclosure of alcoholism during A.A. meetings and at risk situations. Four, national funders of alcohol researchers (e.g., NIAAA) have also channelled funds into propagating the disease theory of alcohol abuse (Room, 1984). Finally, acceptance of the disease theory was also largely due to Jellinek's seminal proposal of types of alcoholics (Jellinek, 1960). He proposed that Gamma and Delta alcoholics fitted the true definition of alcohol disease.

There are many advantages and disadvantages of the disease theory. Certainly, the disease theory recognising personal alcohol-related damage and costs of alcohol consumption was an advance on the personal religious beliefs for prohibition. Prohibitionists believed drinkers were morally and spiritually weak, and judged drinking as sinful gratification. The disease theory acknowledged the alcoholic was sick, which relieved brewers of any responsibility. Alcoholics Anonymous filled a vacuum in treatment strategies. Due to medical and psychological scientists neglecting alcohol research (Clark & Saunders, 1988), A.A., extended its treatment to the whole spectrum of social and heavy drinkers. The work of A.A. was aided by its simple and direct philosophy, the 12 steps to treatment of ones' own alcoholism. In addition, A.A. gave alcoholics a theoretical causal explanation of their alcoholism as a biological predisposed condition that required abstinence for the rest of their life. Members (A.A.) are told that even after years of abstinence they are merely "dry alcoholics" because their disease is never cured. They are told the first drink after many years "triggers a chain" of events within the alcoholic (Clark & Saunders, 1988). Many alcoholics report they feel they have a dormant tumour.

Critics of the disease theory note neither evidence for a disease process, nor a biological predisposing condition has been found. The loss of control "after one drink, one drunk" has been disproved by clinical experience and, for example, by alcoholic clergymen who drink wine everyday without binging (Clark & Saunders, 1988). The lifetime of abstinence is also a disease theory tenet that is not substantiated. Again clinical practice shows many alcoholics can be controlled drinkers. Many critics do not support the central notion of the disease theory of a chain or loss of control concept. According to Clark and Saunders (1988), contexts for drinking are powerful determinants of patterns of consumption. Reviews of the disease theory and A.A. treatment success are often criticised as anecdotal reports of treatment outcome (Ito & Donovan, 1986). Understandably, persons with drinking problems prefer controlled drinking practices than total abstinence for the rest of their lives. A recent multi-treatment and aftercare study reported that the main tenet of the disease theory, that alcoholism was an "incurable" disease, and lifetime abstinence was necessary for recovery, was not well accepted by patients. Furthermore, this study found abstinence was least effective compared to cognitive-behavioral or controlled drinking measures (Ito & Donovan, 1986).

Opponents from the public health perspective list several criticisms of the disease theory. For example, one should recognise that drinking alcohol has a risk factor but is not a disease, personal and social alcohol-related costs are specifically related to per capita consumption, prevention strategies must have as their focus the decline of per capita consumption of alcohol. Room (1984) observed alcohol researchers, particularly epidemiologists, from 1930 to 1950 needed to "dissociate themselves from the temperance ideology". After prohibition was repealed many researchers distanced themselves from temperance beliefs that alcohol was a bad substance and minimised the adverse consequences of alcohol abuse. Their actions were best demonstrated when in 1940 researchers maintained scepticism that alcohol abuse could cause liver cirrhosis, birth defects, and was associated with cancer of the esophagus. Only recently has the public health perspective started to regain the momentum to redress the imbalance that temperance ideology and disease theory created (Room, 1984). In addition, the public health perspective has challenged powerful political, economic, and brewery interests that held the higher ground after shaping attitudes to increase alcohol use in America (Ashley & Rankin, 1988; Room, 1984), in New Zealand (Casswell & Martin, 1986), and Oceania (Casswell, 1986).

The Integration Hypothesis or Responsible Drinking Theory

Proponents used this theory to increase alcohol availability between 1950 and 1960 either ignored, or were unaware, of major health costs these "positive model societies" experienced. This theory maintained that countries of high consumption were "positive model societies" such as the wine producing countries of France and Italy. Positive model societies had integrated everyday use of alcohol within their lifestyles and few drinkers reportedly became alcoholics. Room (1984) also suggested that in the drug literature during the 1950 and 1960 period there emerged opinions that prescription drug abusers could be treated like daily alcohol consumers in positive model societies. If control policy decisions could insulate abusers then their addiction could be minimised in the same way as daily alcohol consumers. The claims of positive model society theorists that daily alcohol use by drinkers, or regular drug use is something desirable and unlikely to be harmful, is clearly unsubstantiated (Ashley & Rankin, 1988; Room, 1984).

Critics (Ravn, 1987) and proponents of the alcohol availability theory argue that any claims by a theory should transfer into educational (Smith, 1983), or primary prevention policies and strategies (Moskowitz, 1989; Room, 1984) and, for example, server intervention strategies (Ashley & Rankin, 1988; Saltz, 1989; Single, 1988). The alcohol availability theory has been the only theory to successfully develop and convince legislators to put in place a workable primary prevention policy (raising the minimum purchase age). Because of this success it has gained recognition as a dominant and potentially useful theory, especially, by developing countries. The control of alcohol availability and increased personal and social alcohol-related costs in member states of the WHO prompted global concerns to limit alcohol availability in national policy decisions because it ranks as one of the "world's major health problems" (Farrell, 1985 p. 1).

Chapter 1 summarised current and historical theories of alcohol use and abuse to control the personal and social costs of alcohol consumption on individuals and communities. Each theory has applied alcohol availability measures to limit the costs of alcohol abuse including laws on the sale of liquor - minimum purchase age (alcohol availability theory), laws limiting the availability of alcohol - prohibitionist theory, and personal constraints on access to alcohol - disease theory. However, the focus has largely been on correlational links between dependent measures and the independent variable, for example, increased consumption measured by traffic crashes following lowering the drinking age. Chapter 2 considers the contributions from the behavioral theory of choice that is focused directly on causal links between the choice of drinking and non-drinking behavior.

Chapter 2

Alcohol and the Behavioral Theory of Choice

Alcohol research has concentrated on the personal and social costs of alcohol abuse. However, the research and theories often focus more on correlational relationships between alcohol variables and costs rather than causal links. This chapter focuses on the behavioral theory of choice as a conceptual framework for the analysis of alcohol abuse. In particular, I examine how alcohol consumption and alcohol abuse can be understood in terms of the context of choices. The alcohol availability theory considers alcohol consumption will increase or decrease (depending on the availability of alcohol), as shown by its dependent variables including liquor sales, traffic crashes, or hospital admissions. The behavioral theory of choice while sharing many common components with the alcohol availability theory it offers a distinctly different level of analysis of the alcohol availability dependent variables.

Alcohol research has rarely considered under what conditions, or contexts alcohol consumption becomes a more preferred behavior. In a major review, Vuchinich and Tucker (1988) examined the application of the behavioral theory of choice to analysis of alcohol consumption and self administered drugs obtained from animal and human choice experiments in laboratories settings. Few, if any, of the theories of alcohol consumption presented in the previous chapter attempt to predict behavioral outcomes. For example, the disease theory, which supports total abstinence, the positive social models theory, and the single distribution theory do not attempt to predict individual behavior. In this chapter, several major aspects of the behavioral theory of choice are reviewed including the main classes of variables in the analysis of drinking as a reinforcing behavior, human experiments of alcohol choice behavior, clinical implications for alcohol relapse, and how the context for drinking might be important in the natural environment.

The Behavioral Theory of Choice

Behavioral formulations of alcohol consumption (Congar, 1956) began when the disease theory was the major alcohol theory attempting to explain why people abuse alcohol. In early behavioral accounts internal or "organismic states" were hypothesised to explain the rewarding effectiveness of alcohol. Such organismic states included affective, motivational, psychological, and cognitive states of the individual. However, the assumptions of these internal accounts of alcohol abuse have been called into "serious question" (Vuchinich, 1982; Vuchinich & Tucker, 1983). There is no evidence that such states explain the rewarding effectiveness of alcohol. (However, it should be noted that recent researchers are attempting to link the these states, that is, the tension reduction hypothesis with the alcohol expectancy hypothesis (Young, Oei, & Knight, 1990)).

The behavioral theory of choice relates choice behavior to the relative reinforcement generated by the choice. The formal expression of the behavioral theory of choice is derived from Herrnstein's Matching Law (Herrnstein, 1970). The Matching law states that behavior is a series of continuous choice situations between two or more alternatives. The Matching Law is a "precise, deterministic, and mathematical understanding of choice behavior". According to its basic equation, "organisms distribute their behavior across available response alternatives in the same proportion that reinforcements are distributed across alternatives" (McDowell, 1988, p. 99).

While many animal studies in laboratory settings have used matching law to explain behavior (see review Pierce & Epling, 1983) its application outside the laboratory has been limited. A number of studies have verified the matching theory in natural human environments within applied settings (see review by McDowell, 1988). Myerson and Hale (1984) focused attention on the difficulty that experimental and applied behavior analysts have encountered attempting to apply the Matching Law in the natural or clinical environment. McDowell (1988) proposed that the question of interest to applied behaviorists and behavioral researchers in the laboratory are the same, that is, "what governs the distribution of behavior across concurrently available alternatives" (p. 98). Other researchers have extended this question by human choice behavior to include an analysis of self-control (Ainslie, 1975; Rachlin, 1974).

The behavioral theory of choice offers a new perspective that readily accounts for changes in environmental events including self-administered drugs, alcohol, nicotine, and changes in the use of other drugs (Tucker, Vuchinich, & Harris, 1985). While this may be a new analytical perspective, it is based on a broad behavioral background of established animal studies, and more recent human studies with alcoholic and non-alcoholic subjects (Vuchinich & Tucker, 1988). From this literature a powerful generalisation was derived, "If constraints on access to a particular reinforcer are increased, there is a tendency for its consumption to be reduced and for behavior to be allocated among other reinforcers in the available set" (Vuchinich & Tucker, 1988, p. 182). Analysis using this framework shows that constraints on access to alcohol and the response requirement for drugs are "remarkably generalisable across a number of reinforcers, species, situations, research strategies, and across settings: as the response requirement increases the amount of drug self administered typically decreases" (p. 182).

The behavioral theory of choice gains its broad application from this generalisability, and from within this scientific environment the behavioral theory of choice has emerged to explain and predict individual drinking behavior in both natural and laboratory settings (Vuchinich & Tucker, 1988). Drinking as a preferred activity is viewed as dependent on the 'value of drinking' and the 'value of alternative choice behaviors'. Contexts in which patterns of alcohol consumption increase reveal therefore that the reinforcement value of drinking is highest in those contexts for drinking.

Choice and Alcohol

The basis of this relationship between choice and alcohol is that drinking is a behavior that is rewarded by its consequences. The question this framework asks is: Why is drinking alcohol a preferred activity, or most preferred activity, by alcohol abusers? Drinking as a highly preferred behavior means that compared to other choices (other behaviors) drinking is more likely to occur because of its consequences. The preference for drinking alcohol versus non-drinking behavior is a function of two classes of variables. The first class considers direct constraints on access to alcohol (A), and for the second class (B) the number of alternative reinforcers and constraints on access to these alternative reinforcers (Vuchinich & Tucker, 1988). These two classes of variables are important for the prediction of individual behavior, and as we shall observe, they can assist in predictions about community behavior.

(A): Increased and decreased constraints on access to alcohol

Direct constraints on access to alcohol involve the requirements to gain access to alcohol. It predicts that as the response cost increases (the physical effort required to gain access to alcohol), or the price or taxation of alcohol in monetary terms increases, consumption should decrease. For example, if minimum purchase age is increased, or the number and density of outlets is decreased, or hours of sale are decreased (all increasing constraints on the access to alcohol), then consumption patterns will decrease. Indeed studies from the perspective of the alcohol availability theory (see Chapter 1) have shown these results. According to analysis from the behavioral theory of choice, if constraints on access to alcohol and response requirement are increased, such as in the loss of a hotel, then the relative value of alcohol consumption will be reduced in relation to alternative behaviors, and alcohol consumption should decrease.

Findings from the alcohol availability theory and predictions from the behavioral theory of choice can both be applied to the natural environment. For example, studies of the price (an alcohol availability independent variable) or response cost (a behavioral theory of choice independent variable) for obtaining alcohol concluded "that the cost of alcohol, both in terms of physical effort, and the prevailing market value, can have a powerful effect on total amount of consumption and the temporal distribution of drinking for all types of drinkers" including casual and heavy drinkers, chronic alcoholics, and male college students (Babor, 1985 p. 181; Moskowitz, 1989 p. 59). Studies have documented price sensitivity of alcohol, and the effects of increased response requirements upon consumption. In particular, increasing minimum purchase age or increasing the price of alcohol, increases constraints on access to alcohol by young persons, and reduces consumption among the 16 to 20 year old age group (see reviews: Babor, 1985; Holder, 1988; Moskowitz, 1989; Room, 1984). Furthermore, Vuchinich and Tucker (1988) observed from alcohol availability studies that price or tax increases, hours of sale, and the number of outlets support the prediction from this framework that consumption decreases if response requirement increases.

Natural occuring constraints on access to alcohol, or studies of decreasing alcohol availability are rare, however, strike studies provide the best example. Strike studies have reported decreased social costs of alcohol consumption including drink-driving crashes, hospital emergency admissions, public disorder offences and victim crimes. These findings from alcohol availability theory, are predicted by the behavioral theory of choice. That is, the alcohol availability theory and the behavioral theory of choice both have a common relation between consumption and constraints on access: if constraints on access to alcohol increased or alcohol availability decrease, there is a reduction in consumption and personal and social cost of alcohol consumption.

Availability and Constraints on access to alternative reinforcers

There is a paucity of research on the availability of alternative behaviors to drinking when compared with laboratory studies of the behavioral theory of choice (Vuchinich & Tucker, 1988). The human studies are presented in more detail below. Probably, the other nearest area of comparison has been in the substitution of alcohol beverages. To apply this to a hypothetical situation, if the real price of wine (adjusted by the annual consumer price index) is decreasing faster than the real price of beer then the economics of demand theory would suggest the substitution of beverages. The choice of wine instead of beer would be an example when an alternative reinforcer is more valued because the response requirement (monetary cost) to obtain wine is less than beer.

Constraints on access to other reinforcers have also received less attention by researchers. If constraints on access to other reinforcers increase then the behavioral theory of choice predicts alcohol consumption will increase. This may be a determinant of alcohol and self-administered drug relapse. For example, if life events changed due to unemployment or the loss of a spouse, then the pressure to drink, smoke, or take drugs increases, especially if he/she is a recent controlled drinker or abstainer (Tucker et al., 1985).

Experimental studies of the behavioral theory of choice

According to Vuchinich (1982), decreased access to alternative reinforcers is an important determinant of behavior in the natural environment. In reviewing drug studies, Vuchinich and Tucker (1988) reported that behavior maintained by alcohol or drugs was similar to the choice between drugs and alternative reinforcers. Animal studies showed the "amount of alcohol and drug consumption varied inversely with the availability and amount of alternative reinforcers" (p. 184). That is, if constraints on access to alternative reinforcers increased the choice to consume alcohol or drugs increased.

Three laboratory studies of alcohol choice by humans have been published. The first experiment (Vuchinich & Tucker, 1983) examined the effects of constraints on access to alternative reinforcers on preference for alcohol consumption in non-alcoholic males. Fifty-four undergraduate students were seated at a console and given the choice between receiving alcohol at the end of the session, or the choice of money (2¢ or 10¢) with zero, 2 week or 8 week delay. In this study, alcohol consumption was predicted to increase if rewards became smaller, were delayed, or the unavailability of rewards increased. Three dependent variables were the primary focus of this study. The main dependent measure was the proportion of responses allocated to the choice of alcohol. Results showed that subjects' choices of alcohol varied inversely with increased delay and low money reward. Second, because alcohol theories have considered the importance of internal factors as responsible for alcohol abuse this study also investigated mood states (tension, anxiety) and "response-outcome expectancies". Results showed that neither expectation of a reward, nor mood states were related to subjects' choice behavior. A second human study (Vuchinich, Tucker, & Rudd, 1987) used the same delay procedure as the first study above. Sixty male non-alcoholic undergraduate subjects were seated at a console and given the choice between winning money or receiving alcohol. Subjects had a choice of receiving alcohol at the end of the session or receiving money (10¢) upon the throw of a dice with .17 or .83 probability. In addition, constraints on access to money were zero, 2 week and 8 week delay in receiving money. These two independent variables (money and delay) were of course constraints on access to alternative reinforcers. The rationale for the probability component was that the value of constraints on alternative reinforcers varies in real life. That is, drinking as a behavior (not a reinforcer) varies over time and is influenced by changes in one's environment (e.g., relationships, time commitments, finances, or employment status). The results essentially replicated the findings of their first study (Vuchinich & Tucker, 1983). Subjects' preference for alcohol increased as delay in receipt of money increased, or as amount of money reward decreased. Analysis of variance showed a significant effect between delay and the number of drinks received. As delay increased subjects' choice and receipt of alcohol increased. Subjects' choice of zero delay received the least number of drinks and 8 week delay the most number of drinks; zero, 2, and 8 weeks delay received respectively .82, 1.26, and 2.06 standard drinks. As delay in receipt of money increased (i.e., increasing constraints on access to alternative reinforcers), preference for alcohol increased.

However, some subjects also gambled on the money reward option instead of preference between money and alcohol. Perhaps gambling on receipt of money (10¢) was a more enjoyable or attractive choice than alcohol. This manipulation of a less certain and probabilistic outcome increased money reward choice as all subjects preferred money more often than the first study (Vuchinich et al., 1987).

A third human study examined the preference between alcohol and video games (Landau, 1986). Six subjects were first given an easy task to earn tokens, they then had to pay for access to computer video games or buy alcohol during a 1 hour session. One token could purchase one standard drink or 6 minutes of computer video playing time. Subsequent manipulation of the price of video games was used to observe if preference shifted from buying video games to purchasing alcohol. Results were consistent with other research regarding the manipulation of price as a constraint on alternative reinforcers (Vuchinich & Tucker, 1983; Tucker, et al., 1987). As the price of video games increased subjects shifted their preference to alcohol consumption. This result is further supported by nine other studies that manipulated the effects economic availability had on consumption (Babor, 1985). Babor concluded that the cost (value) of alcohol, the cost in terms of alcohol availability, and the effort required to obtain a drink (constraints on alcohol) were important factors for drinkers.

Two subjects in Landau's study, however, continued to buy more expensive video time. Similar findings have been reported in animal laboratory studies of near exclusive preference for alternative activities to alcohol and drugs despite the increasing costs of these activities (Vuchinich & Tucker, 1988).

Implications of Experimental studies

These studies based on the behavioral theory of choice have wider implications for alcohol abuse, social-learning theory, clinical research, post treatment alcohol relapse, and the contexts for drinking. I shall briefly consider these implications, and how the allocation of individual and community behavior in the natural environment can be understood from this perspective.

In the three studies alcohol consumption increased as delay in receipt of alternative reinforcers increased. As the amount of alternative reinforcers decreased alcohol consumption increased, or as constraints on access to alternative reinforcers (e.g., delayed money reward) increased alcohol consumption increased. These findings confirm predictions from this framework that preference for alcohol varies inversely with decreased constraints on access to alcohol, and varies with constraints on access to alternative reinforcers and varies inversely with the availability of alternative reinforcers.

These studies also challenge social-learning theories. These theories emphasise two variables. (1) Preference for delayed rewards decreases if the expectation of receiving the reward is reduced or its outcome is reduced. (2) Delay periods are aversive and frustrating. The first two studies showed no effect of these two variables (Vuchinich & Tucker, 1983; Vuchinich, et al., 1987). Subjects' mood states such as tension, or self-awareness were not related to choice behavior. Moreover, subjects' response-outcome expectation of receiving the rewards was also unrelated to choice behavior. Therefore, expectancy or delay aversion do not appear critical determinants of the choice of alcohol and other activities.

These studies also have clinical significance for treatment outcomes. Findings from these three studies do not directly question the cognitive learning variables but suggest that while "organismic states may be correlated" with alcohol and choice, clinicians should also consider the "temporal and environmental" constraints on alternative life events, or leisure activities. Clinicians should assess what alternative reinforcers are available to their clients. Clinical assessment of the availability of alternative reinforcers maybe more important for future treatment research of alcohol abuse. Vuchinich and Tucker (1983) stated that the context in which alcohol (as a reinforcer not as a behavior), will or will not be a reinforcer, is defined by the environmental access and availability of alcohol and alternative reinforcers. A previously neglected question of alcohol abuse has been "identifying the parameters of non-drinking (alternative reinforcers) that determine their reward value in relation to the reward value of alcohol" (p. 262).

The examination of the value of alternative reinforcers to drinking, therefore, helps identify the real value of alcohol consumption. This question has direct application for relapse studies, (c.f., Tucker, et al., 1985). Future research from this framework should consider the choices between alcohol and alternate activities (e.g., leisure activities) and changes in constraints on access to these activities, particularly, when alcohol consumption becomes the less highly preferred activity from a range of choices. These are questions the present naturalistic study will address. Tucker, Vuchinich and Harris (1985) conclude that future research from this framework should investigate people's allocation of behavior to a range of activities that occur and constraints on engaging in those activities, as well as determining under what conditions, or contexts, alcohol is the most preferred activity among a range of activities.

Other theories of alcohol abuse such as the disease theory refer to craving as the central notion for relapse by alcoholic patients. However, neither craving nor its reformulations in terms of arousal are clinically useful, nor empirically supported (Tucker et al., 1985). Cognitive-social learning approaches to relapse reveal a possible (weak) association between coping skills in social situations and the positive or negative view of alcohol; these may play some part in the likelihood of relapse. However, the relation between negative life events and post treatment relapse may be more important. Similarly, the loss of control concept to explain alcohol relapse also lacks empirical support, and maybe even ambiguous with over use (c.f., Room, 1984). Loss of control was based on two behaviors, entering "high-risk" contexts for drinking, and continued consumption is derived because of a series of changed "cognitive states, cognitive dissonance, and internal attributes that promote further drinking" (Tucker et al., 1985). Predictive and correlational studies of alcoholic relapse reviewed revealed that the loss of control on one occasion does not necessarily lead to a prolonged alcohol relapse. Second, relapse did not appear to be related to stages but the authors suggest existing environmental events at the time of relapse maybe more important. Tucker et al., (1985) reviewed this literature and concluded that data from specific life events, and high-risk contexts, are consistent with the analysis of the behavioral theory of choice framework. Probably the most promising area in relapse research is the assessment of environmental events and relapse episodes, particularly, determining the type of dependent measures that are evident before a relapse event.

A New Zealand study that randomly assigned 113 subjects to three treatment options showed relapse was high across all treatments. Howden-Chapman and Huygens (1988) evaluated the three treatment options for alcoholism that included a single confrontational interview, a 6-week outpatient treatment program, and a 6-week in patient treatment program. Results showed by 18 months followup no treatment was more effective than the other. This study suggests possible changes to aftercare maybe of specific benefit to individuals in their natural environment. Ito and Donovan (1986) reviewed aftercare relapse literature and concluded there was an urgent need for alcohol relapse models, which can derive data collection strategies, intervention strategies, and coping with stress (life-events) strategies during times of patient need. Analysis of life-events from the behavioral theory of choice is presently in progress (see Vuchinich & Tucker, 1991; Relapse in Alcoholics as choice behavior, cited in Tucker et al., 1991).

The Experimental setting

Choice and Alcohol

In the natural environment there are few natural occuring examples of changing constraints on access to alcohol except strike studies, the price of drinks, or the number of outlets. In the present naturalistic experiment constraints on access to alcohol were increased following hotel closures. The destruction of hotels reduced alcohol availability in two experimental towns with off-license facilities lost and on-license facilities reduced to limited club bar sales. The choice to drink in experimental towns was therefore severely constrained. These events offered an opportunity to examine and compare changes in drinking and non-drinking activities in four selected proximal control towns. Town A hotel was closed following a fire. Town B hotel, which is 25 kilometres drive from Town A, closed after an earthquake (measuring 6.5 on the Richter scale) rendered its 100 year old hotel structurally unsafe. Earthquakes are a common occurrence in New Zealand with about 200 each year. The Town B earthquake caused mainly structural damaged to drains, houses, housing piles, roads, and factories silos. Several people suffered lacerations or bruising, but there were no serious injuries.

The aim of the present study was to examine the effects of reduced alcohol availability in terms of the behavioral theory of choice. The major dependent variable of this study is alcohol consumption by individuals and at a community level. The major independent variable is the constraints on access to alcohol, or the availability of alcohol in experimental and control towns. The independent variable is common to both the alcohol availability theory and the behavioral theory of choice. Until recently, changes in the availability of alcohol have been studied using correlational analysis of various dependent measures including liquor sales, drink-driving, and crime to name but a few. In a laboratory setting, the behavioral theory of choice has directly studied individual choice behavior in relation to constraints on access to drinking and alternative reinforcers. The pivotal difference between the alcohol availability theory and the behavioural theory of choice is that the latter considers the opportunity to choose drinking behavior over non-drinking behavior as continuously available.

The behavioral theory of choice is therefore a wider theory from which to make predictions at an individual level. However, this study attempts to apply the behavioral theory of choice at a molar or community level of analysis using similar dependent measures as found in alcohol availability literature. Moreover, the behavioral theory of choice serves this study better because it can make meaningful predictions about possible non drinking behavior based on a large body of reinforcement literature and human choice studies (Vuchinich & Tucker, 1988).

The first study (Chapter 3) concerns several dependent variables including patterns of consumption, and the independent variables of alcohol availability and the context for drinking. This study investigated the effects of reduced alcohol availability, or increased constraints on access to alcohol on liquor sales, patterns of consumption, and levels of consumption in experimental and control towns.

The second study (Chapter 4) concerning crime and alcohol availability investigated ordinary and serious offences separately, and asked; if constraints on access to alcohol increased would consumption decrease, and would crime decrease in experimental towns, and continue to increase in control towns, and would serious crime decrease in experimental towns and continue to increase in control towns.

The last study (Chapter 5) took a novel approach to the study of constraints on access to alcohol by examining leisure activities as alternative activities to drinking. Based on the behavioral theory of choice this study asked; would experimental town residents engage in more non-drinking activities after hotel closures, and would control town residents engage in drinking-related activities?

As yet there is no direct evidence from studies of alcohol consumption concerning the prediction and interpretation of choice behavior in natural settings. By treating alcohol consumption as a behavior maintained by its consequences it is entirely appropriate to contrast it with competing alternative behaviors in experimental and control towns.

Chapter 3

Patterns of Consumption: Alcohol Availability and the Context for Drinking

Alcohol availability has been measured in terms of price, number of outlets, hours of sale, and the minimum purchase age. It has been argued that these variables are important determinants of consumption of alcoholic beverages and should therefore be included as components of prevention strategies (Moskowitz, 1989; Ravn, 1987). Moskowitz (1989) recently reviewed the effects of alcohol availability on consumption, and on alcohol problems such as liver cirrhosis and motor vehicle crashes, and evaluated the effects of primary prevention programmes. Studies investigating raising the minimum purchase age have shown reductions in alcohol consumption and motor vehicle crashes by young drivers (c.f. O'Malley & Wagenaar, 1991; see reviews by Holder, 1988; Room, 1984; Smith, 1983; Wechler, 1980). In American States where minimum purchase age has been raised, alcohol taxes have been increased, or drink-driving laws have been enforced there has been a reduction in alcohol-related problems. Moskowitz (1989) concluded that prevention strategies should therefore aim to decrease alcohol availability.

Studies of alcohol availability from outlets with on-premise licenses, and off-premise licenses have, however, shown mixed results. Alcohol availability research using correlational or regression analyses has shown a positive relationship between the number of outlets and consumption, no relationship, or a negative relationship (Ashley & Rankin, 1988, Farrell, 1985; Single, 1988; Smith, 1983). Most studies from Canada, United States, and the United Kingdom have reported a positive relationship between the number of outlets and the consumption of wine, beer and spirits. For example, wine sales increased between 120% and 305% in the first year following introduction of grocery store wine sales in four American states (Hammond 1975). Another study reported a positive relationship between consumption of wine and spirits and 'new' off-premise outlets in Michigan (Douglas, Wagenaar, & Barkey, 1980). States that did not have controls on the number of outlets per unit of population showed increased alcoholism rates (Parker, Wolf, & Harford, 1978). In England, multiple regression analysis showed that the number of licensed premises influenced consumption (McGuinness, 1980). An American study also reported a positive relationship between on-premise outlets and consumption (Colon & Cutter, 1983). Per capita consumption of "spirit" sales has also been associated with an increase in the number of retail liquor outlets per 1000 population (Loeb, 1978).

Other studies reported no consistent increase in liquor sales. In Iowa wine sales did not increase following increased off-license wine outlets (Mulford & Fitzgerald, 1988ab; but see Wagenaar & Holder, 1991). A Canadian study failed to find a relationship between per capita consumption of spirits and the number of retail liquor outlets per 1000 population across 10 Canadian provinces for the period between 1951 to 1974 (Barnes & Bourgeouis, 1977). Another Canadian study failed to find a relationship in 10 Canadian provinces between per capita consumption of beer and variables such as minimum purchase age, restricted off-licenses, on-license sales, weekday and Sunday trading hours, and the density of outlets (Smart & Finley, 1976). Two studies of alcohol availability in New Zealand showed inconsistent results regarding the effects of alcohol consumption on motor vehicle crashes. The first study analysed traffic crashes after 6.00 pm closing was changed to 10.00 pm and found no change in accident rates following increased alcohol availability (Toomath & Nguyen, 1974). A second study reported a reduction in motor vehicle crashes, crime, and hospital admissions during a 6 week break in beer supplies (Brown, 1978).

Methodological aspects of most previous studies of alcohol availability do not allow straightforward interpretation. One of the problems is that liquor controls in different countries or American states entail different ownership systems and regimes (Single, 1988). Another problem is that the context for drinking may moderate availability (Holder, 1988). Yet another problem is the reliance on correlational design and haphazard combinations of dependent measures. In this regard, one reviewer referred to "a Babel of indicator combinations" (Ravn, 1987, p.974). According to Douglas Wagenaar, and Barkey (1980),

> A major difficulty in analysis of alcohol availability has been the absence of "natural experiments" to monitor the consequences of changes in alcohol availability. The lack of manipulated changes have forced the analysis into regression and correlational designs (p.404).

Several authors have called for the return to "natural experiments" (Room, 1984 p.312), control group comparisons (Mulford & Fitzgerald, 1988a, p.1272), and the use of smaller areas, such as a county, as an appropriate unit of analysis (Holder, 1988). In the present study we examined consumption in a small region of New Zealand in which the destruction of hotels in two small towns produced a change in availability. This afforded a comparison of consumption, assessed in terms of liquor sales and interview responses, between the towns without hotels and towns where availability remained unchanged. We also examined the context for drinking, because a change in availability may generate a change in the context for drinking (for example from bars to homes). In particular, the context for drinking may modulate the effects of availability (Holder, 1988, Single, 1988).

According to Single (1988) most context studies have focused on the behavior and drinking patterns of groups or lone drinkers. He reviewed studies in both Canada and United States suggesting that characteristics of the drinking group can dictate the rate of drinking. Drinkers in groups consume more and stay longer in bars, and light drinkers are encouraged to drink faster. Lone drinkers drink faster but stay shorter durations. Single (1988) concluded that drinking behavior and rate of drinking is also influenced by a variety of aspects of the physical environment: whether slow music is played, whether cubicles within a large drinking area are offered, and whether background noise is loud or of long duration.

O'Donnell (1985) reviewed 13 studies of the relation between the context for drinking and drink-driving offences. She concluded that nearly 50% of offenders had been drinking at licensed premises, which suggested significant potential for primary prevention strategies at licensed premises. Clark (1981a) reviewed three approaches that have been used to study tavern bars and cocktail bars; observational or ethnographic, quantitative and behavioral, and surveys. Early observational studies (1960-1970) identified home territory bars dominated by regulars, nightspot bars dominated by live music, marketplace bars that were places for trading in sex, drugs, and stolen goods, and convenience bars in restaurants (Clark, 1981a). Bar patronage was influenced by occupational and socioeconomic status, age, race, gender, and sexual orientation. Quantitative and behavioral studies described bars by the particular clientele or specific functions they served, such as neighbourhood taverns, downtown bars, skid-row bars, and gay bars. In some bars unwanted patrons are discouraged from drinking and the behavior of patrons admitted is regulated. The number of patrons varied according to time of day and day of the week, and "happy hour" prices increased consumption. Survey research on bars and taverns indicated that age, gender, and marital status, were related to patterns of drinking with young unmarried males frequently among tavern patrons. Clark (1981b) noted that in survey studies from Scotland, Canada, France, and America the amount patrons consume was related to the frequency of visiting taverns. That is, frequent patronage of taverns and bars in these countries indicated higher consumption. Few studies have, however, investigated whether tavern patronage is related to drinking problems (Clark, 1981a).

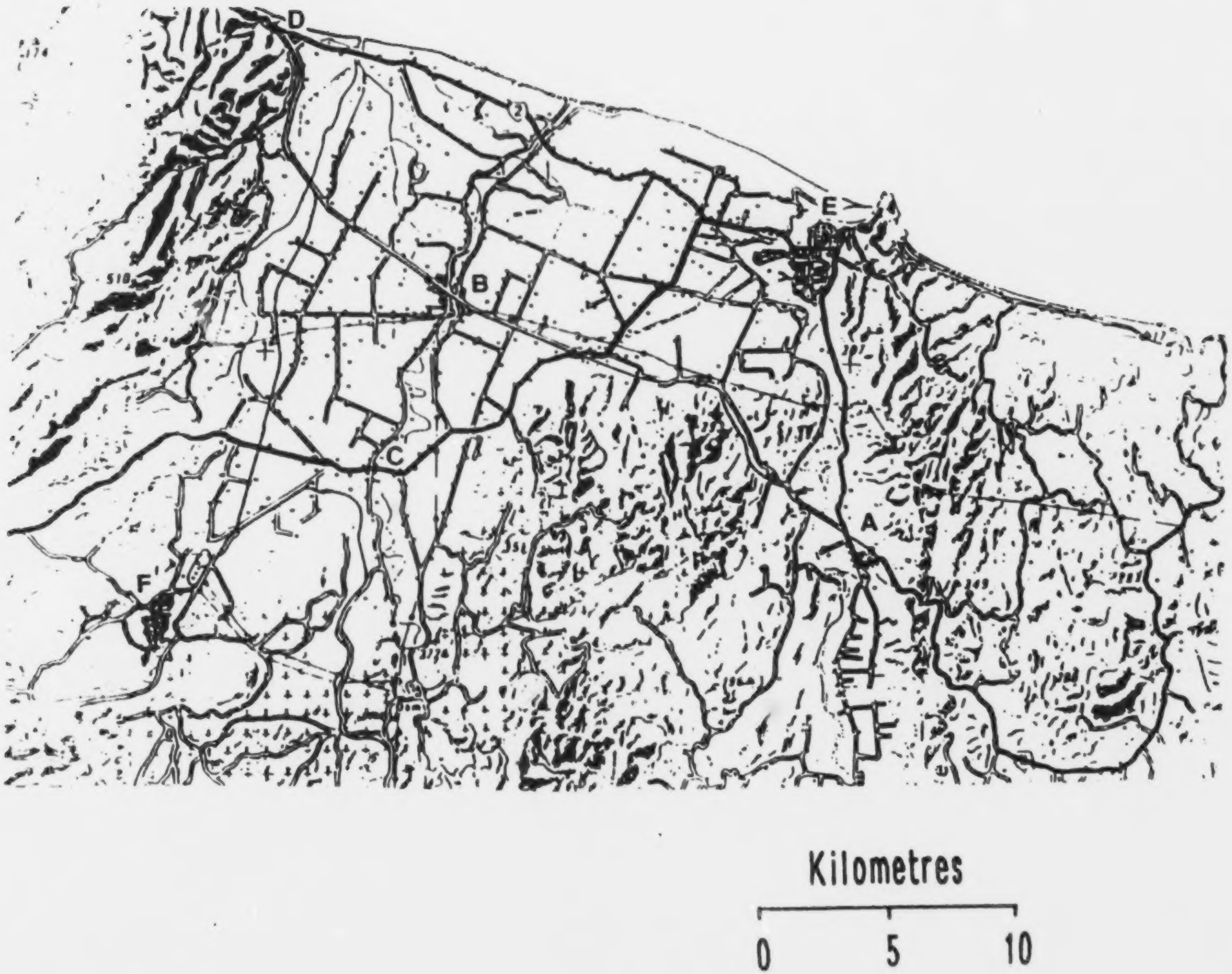
In two national interview surveys of contexts for drinking in 48 States during 1979 and 1984, bars, taverns, and cocktail lounges provided contexts for heavy drinking and accounted for 28% of drinks consumed per month (Clark, 1985; 1988). Parties were also contexts for heavy drinking and accounted for 17% of drinks consumed per month. Clubs accounted for 5%, miscellaneous contexts (e. g., restaurants) accounted for 17%, and homes accounted for

33% of drinks per month. The replication survey (1984) showed that alcohol consumption in each context was similar to the 1979 survey (Clark, 1988). This study concluded that male and female tavern regulars frequently consumed more than all other drinkers. Both tavern regulars and light drinkers consumed more when drinking at bars and parties than in miscellaneous contexts for drinking (Clark, 1988).

The results of a New Zealand naturalistic study (Bradbury & Clark-Reynolds, 1985) showed considerable agreement with the USA survey (Clark, 1988). Bradbury and Clark-Reynolds (1985) found that hotel contexts influenced the type of clientele, the length of time a patron stayed to drink, the number of persons drinking alone or in groups, the price of drinks, and the number of patrons who drank daily at a hotel. They studied three bars with differing decor and environment. Bar A was a public bar in an old city hotel. It lacked cleanliness, and carpets were worn. Bar B was between Bar A and Bar C; a tavern public bar, old but not dilapidated. Bar C was an inner-city tavern attached to a modern shopping complex. Some Bar A patrons had been daily drinkers there for 25 years or more. Most patrons never stayed less than an hour and 33% stayed all day Saturday. Bar C (of modern interior) had few regular drinkers, few drinkers stayed more than one hour, and patrons were prepared to pay higher prices for the more pleasant surroundings. Bar B patrons stayed longer in the evening than Bar A and B patrons. Beer was the most popular drink in Bars A and B, with mixed drinks served more often in Bar C. Thus the different contexts affected the type of clientele, their drinking behavior, the price of drinks, and length of stay. This finding is consistent with Single's (1988) conclusion concerning the effects of contexts on consumption. The different effects of the context for drinking show that a change in overall consumption may occur owing to altered patterns of consumption. That is, different contexts encourage different patterns of drinking. Whenever a change in alcohol availability occurs because of a change in the number of outlets, it is likely that there will be a concomitant change in the context for drinking, owing to a redistribution of types of outlets for drinking. The effects of alcohol availability on consumption may therefore be mediated by an effect of the context for drinking on patterns of consumption.

The present paper describes a naturalistic experiment to study consumption in a small region of New Zealand in which two hotels were destroyed, one by fire and the other after an earthquake. This caused a reduction in alcohol availability with changes to on-license bar facilities and closure of the sole off-license (take home) retail outlets. These events offered an opportunity to examine the effects of a change in alcohol availability. Dependent measures were derived from two sources, public records and interviews. The public records provided measures of total liquor sales and drink-driving offences. These measures were supplemented by interviews with random samples of the residents in four towns. Town A and Town B were "Experimental towns" and were affected by the availability change. Two towns, Town C and Town D, with hotel facilities, were within 20-30 kilometres drive of Towns A and B and were treated as "Control" towns. Towns E and F were added to the analysis of public record data so all license premises and drink-driving areas in the region were included.

3.1 Map of the present study area


D
E
B
C
A
F
Kilometres
0
5
10

METHOD

Design

Liquor sales data from a small number of outlets made it possible to track changes in alcohol consumption following reduced alcohol availability. Sales data from all licensed outlets in the region included 9 hotels and taverns (which are not required to offer accommodation facilities in New Zealand), 2 licensed tourist motels, 6 chartered clubs, and 20 sports clubs. These data afforded both between-group comparison between experimental Towns A and B and control Towns C, D, E and F, and within-town comparison between the two year period before hotel closure and the two year period during their closure. Police records of drink-driving offences in experimental (A and B) and control towns (C, D, E and F) afforded comparison of these offences before and after hotel closures. Interview responses as to the amount, day, and context for drinking by small samples of experimental (A and B) and control town (C and D) residents afforded between-group comparison of reported consumption in order to confirm the liquor sales data and to provide information on context. The relative proximity of towns within one county, or region, was an advantage because it ensured comparability between the towns in terms of socioeconomic factors. Other factors such as outlet hours of sale remained constant, and the number of outlets and proximity of towns were stable.

Populations

Liquor sales figures were obtained from all licensed premises in six Towns A, B, C, D, E and F within the same geographic region of New Zealand (Figure 3.1). Additionally, small samples of residents in each of Towns A, B, C, D, were interviewed. All towns were proximal to the major Town E (population 22,944), which had full facilities including a hospital delivering service to a regional population of about 35,000. According to the 1986 Census, populations of Towns A, B, C, D, E and F were respectively 891, 1929, 594, 528, 22944, and 8595 persons. The location of the towns within the same geographic area afforded comparability of general socioeconomic status, and they were sufficiently distant to be regarded as independent units.

Closure of licensed premises

The sole hotel in Town A was destroyed by fire in December, 1987. The sole hotel in Town B was demolished after the March 1987 earthquake. These events affected alcohol availability through the loss off-license outlets, and a reduction in on-license bar facilities in both towns. On-license facilities (clubs and hotels) are permitted to sell bar sales liquor. Off-license outlets are permitted to sell unopened, packaged, or bottled liquor over the counter. The nearest off-license premises from Town A was 25 kilometres drive to Town C, or 12 kilometres to Town E (Figure 3.1). The nearest off-license premises from Town B was 8 kilometres drive to Town C, or 30 kilometres drive to Town E. Outlets in Towns C and D remained unchanged. Hence Towns C and D served as a comparison for changes occurring in the "Experimental towns" Towns A and B. Town E was 12 kilometres drive from Town A, 30 kilometres drive from Town B, and 25 kilometres drive from Town D. Town F was 20 kilometres drive from B and C, and 40 kilometres from Towns A and E. A new hotel was constructed in Town A and opened in June 1989, and a new hotel in Town B opened in December, 1989.

Type and number of outlets

All clubs were only permitted on-license bar sales. One notable difference between types of clubs is that sports clubs are permitted to sell liquor only when a sports event, or training is in progress. All chartered clubs in this study were permitted to sell liquor during on-license hours similar to a hotel, 10.00 am to 10.00 pm.

After Town A hotel closure, on-license premises included three clubs: one each of rugby football, squash, and lawn bowling clubs. After Town B hotel closure on-license premises included one chartered club, and three sports clubs: one each of a rugby football, squash, lawn bowling club, and a licensed social club. For Town C, 8 kilometres from Town B, licensed facilities remained unchanged following the earthquake. Town C included a hotel with wholesale off-license facility, and two on-license sports clubs: a golf and rugby football club. Town D had a hotel with on-license and wholesale off-license facility, and one licensed rugby football club. Town E had four hotels, two licensed tourist motels, three chartered clubs, and six licensed sports clubs. Town F had one hotel with on-license bar facilities, an off-license wholesale outlet, two licensed chartered clubs, and four licensed sports clubs. The number and type of outlets remained stable from 1984/85 as no new licenses for on-license or off-license hotel outlets or clubs were issued, except two chartered clubs in Town F in 1988/89 and a tourist motel in Town E.

Liquor Sales

Annual liquor sales by 37 licensed premises (between 1982 and 1989) in Towns A, B, C, D, E and F were obtained from the Licensing Control Commission (LCC); a New Zealand Government tribunal of the Justice Department. The LCC hears liquor license applications before a high court judge, and renews and controls existing licenses by statutory authority of the Sale of Liquor Act 1989. According to the Sale of Liquor Act 1989, all licensed establishments including sports clubs, chartered clubs, social clubs, hotels, and motels are required to submit a form reporting annual liquor sales and the numbers of club members to the LCC. Failure to do so within a proscribed period could result in either prosecution and fine, or possible withdrawal of the liquor license. These forms were usually completed for licensed premises after an accountant's audit.

Drink-driving offences

Police National Headquarters supplied summarized and detailed quarterly drink-driving offences by residents in the towns under study (offences for Towns D and E were combined). Drink-driving offences included driving with excess breath/blood alcohol (above 80 mgs of absolute alcohol), and causing an accident or injury with excess breath/blood alcohol. Each police officer codes and files a weekly incident report from daily incident records. Police computer personnel at district headquarters (Town E) entered and verified traffic offence data. All district headquarters have a computer link to the Department of Justice National Computer centre. Monitoring of traffic offences occurs at every policing level including each police station, district headquarters, and regional headquarters. Internal auditing occurs at each policing level.

Interviews of Residents

Residents of Towns A, B, C and D were interviewed in May, 1989. Twenty residents from each town were randomly selected from the 1986 electoral roll. The random method ensured that each resident had an equal chance of selection. Residents were telephoned and asked if an appointment could be made at their home for an interview about the effects of the hotel closing. If a resident declined by telephone or after an appointment, the next person on the electoral roll was contacted. Residents gave written informed consent to the interviewer (the interview procedures were approved by the University Ethics Committee).

A structured interview was constructed from interview and questionnaire forms used in other alcohol studies in New Zealand. The structured interviews were conducted to determine patterns of alcohol consumption including the last drinking occasion, previous drinking occasions over the last month, the type of drink(s) consumed, the physical context and days of drinking, off-license liquor purchases, and demographic information. In relation to questions about previous drinking occasions, detailed photographs of glass sizes containing a wide range of beer, low calorie beer, homebrew, wines, spirits, fortified wines, and liquors were shown to residents for identification. Each drink was converted into an absolute alcohol measure, milligrams of absolute alcohol by volume, from a drink-intensity index of all beverages, as used in the 1985 Milton survey (Paulin, Simpson, & Wall-Manning, 1985).

3.2 Total liquor sales for experimental (A and B) and control towns (C and D)

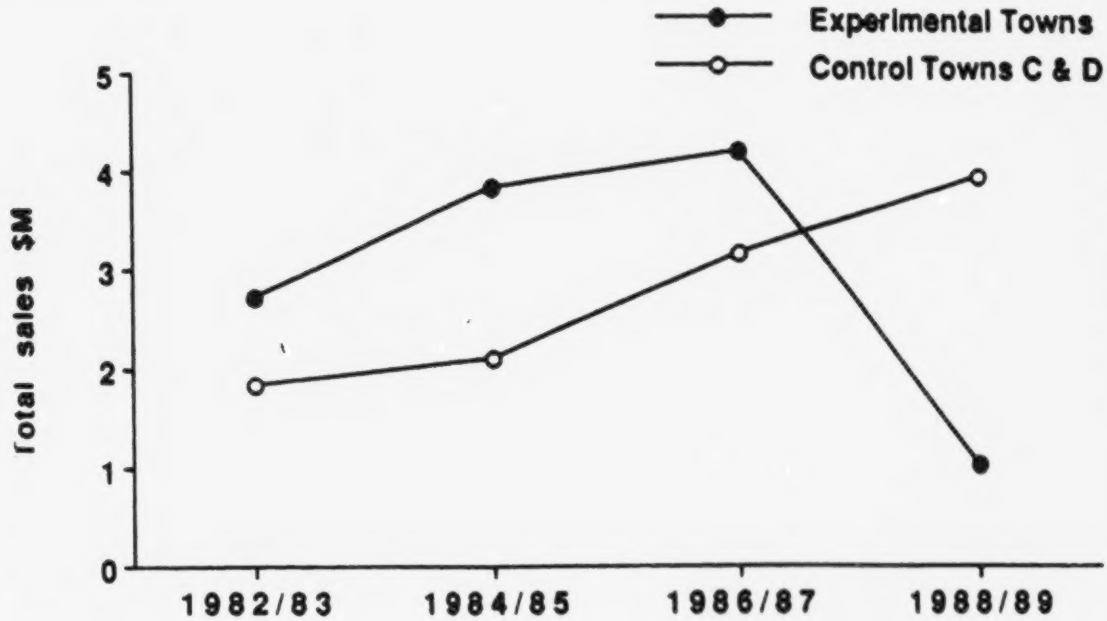

Experimental Towns
Control Towns C & D
Total sales $M
0
1
2
3
4
5
1982/83
1984/85
1986/87
1988/89

Table 3.1. Total liquor sales turnover for Experimental (A & B), Control Towns (C & D), and Towns E and F

Towns	1982/83	1984/85	1986/87	1988/89
A	821,432	1,086,623	2,196,224	172,584
B	1,891,168	2,717,768	2,990,176	841,371
C	988,532	1,252,087	1,737,002	2,086,952
D	847,757	841,537	1,420,111	1,833,183
E	7,744,174	10,124,004	12,958,535	15,080,949
F	3,679,567	3,191,555	2,703,160	4,170,282

RESULTS

Alcohol Sales

Figure 3.2 shows total on-license and off-license total liquor sales for all hotels and clubs from 1982/83 to 1988/89 for experimental (A and B) and control towns (C and D). The 1988/89 period for the experimental towns covered the period during which the hotels were closed. Following the closure of hotels in Towns A and B, total sales decreased by 80% from $5,186,400 in 1986/87 to $1,013,955 in 1988/89. Total sales in the control towns increased 20% from $3,157,113 in 1986/87 to $3,920,135 in 1988/89. The dramatic reduction in sales in experimental towns (Figure 3.2) is of course the expected result of the loss of the hotels and confirms the expected change in availability. The question of interest is whether this change was accompanied by a change in consumption. The conclusion we draw from the converging lines of evidence presented below, including interview and drink-driving data, is that total consumption by residents of the experimental towns decreased compared to consumption by residents in control towns. Additionally, the patterns of consumption changed although the frequency of drinking occasions did not.

Town A total sales decreased 92% after the hotel closure. Town B total sales decreased 72% after the hotel closure. Besides recording sales for the "matched" control towns (C and D) we also recorded sales for Town E, the largest town in the region, and Town F a small but more distant town. Together, these towns accounted for all the licensed premises in the region. Table 3.1 shows total sales in the six individual towns for two year periods from 1982/83 to 1988/89. In all control towns (C to F) there was no systematic decrease in sales. In particular, each of the control towns showed an increase in sales from periods 1986/87 to 1988/89 whereas the experimental towns showed marked reductions in sales. Towns E and F provided verification that sales patterns for control towns C and D were consistent with consumption in the wider geographic and more distant locations within the region.

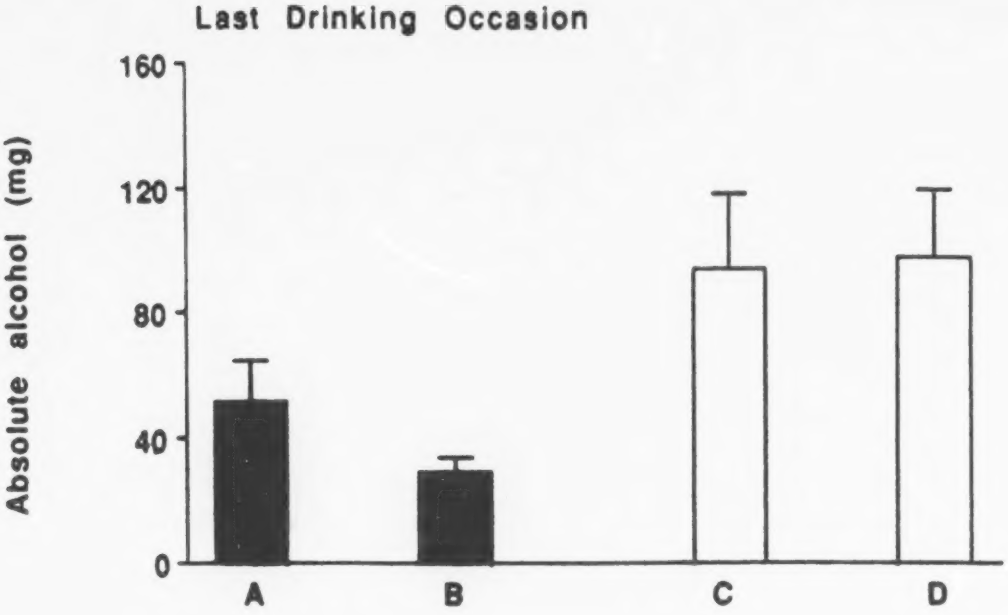
Table 3.2 Annual sales per outlet, mean outlets per year, members per year, and mean spending per member in experimental (A and B) and control towns (C, D, E, and F) from 1984 to 1989.

Experimental (A and B)

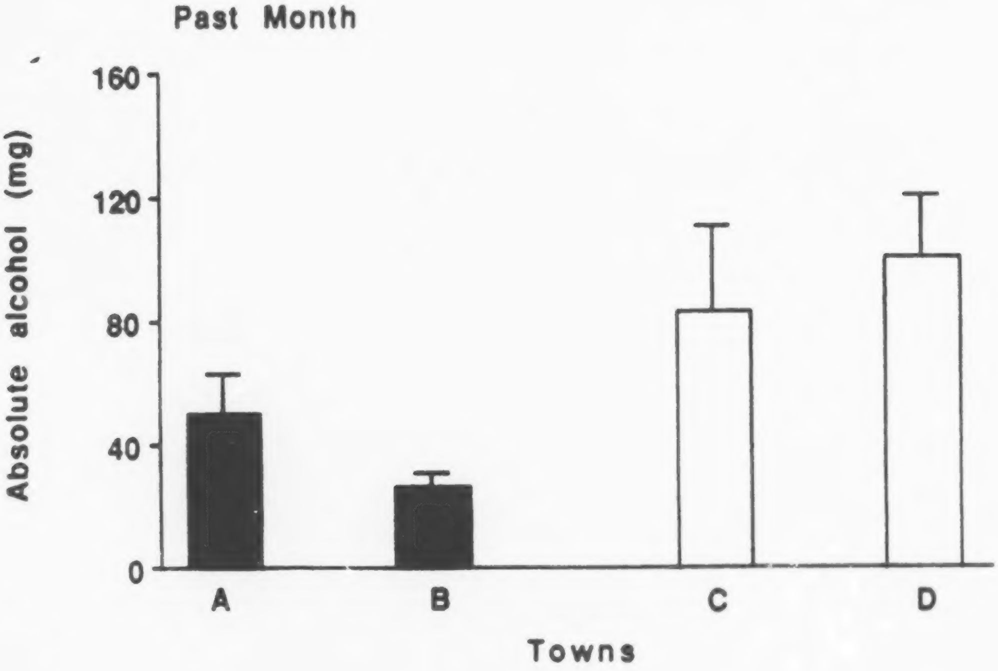
Type of Club	Mean outlets per year	Annual sales per outlet	Members per year	Mean spending per member
Chartered	1.33	178,924	552	354
Bowls	0.83	15,561	32	316
Football	1.83	41,433	410	243
Social	1.0	49,810	294	104
Squash	2.0	21,991	526	66

Control (C, D, E & F)

Type of Club	Mean outlets per year	Annual sales per outlet	Members per year	Mean spending per member
Bowls	2.50	74,286	512	362
Chartered	2.83	226,346	2040	314
Football	6.50	50,371	1137	287
Golf	3.16	65,620	1269	163
Squash	0.83	42,392	392	89
Sports	0.83	76,783	797	79
Social	0.83	12,749	286	37



Last Drinking Occasion



Past Month

Table 3.3 Drink-driving offenses per 1,000 in experimental (A and B) and controltowns (C, D and E, and F) between 1986/87 and 1988/89 during hotel closures

Years	1986/87	1988/89
Experimental		
A	3	1
B	10	2
Total	13	3
Control		
C	9	15
D & E	2	5
F	2	12
Total	13	32

An increase in Town E sales of $3.32 million between 1986/87 and 1988/89 was mainly from one hotel. The licensee of this hotel in Town E also held the license of the hotel in Town A. During the 1988/89 period total sales by his Town E hotel increased $1,639,437 suggesting that residents from both experimental towns may have purchased liquor supplies from his off-license outlet. This possibility was confirmed by the interview data presented below. A further $1.62 million increase in liquor sales came from Town E clubs. In Town F liquor sales increased $1.47 million between 1986/87 and 1988/89. Two new chartered clubs accounted for almost $1 million of this increase.

Liquor sales in clubs

Comparison of liquor sales (on-license bar sales) in clubs suggests that consumption differed markedly across different types of clubs. For each club a dependent measure of "mean spending per club member" was derived by dividing the annual liquor sales by annual number of club members. Mean annual sales, outlets, members, and mean annual spending per member in experimental (A and B) and control towns (C, D, E and F) from 1984 to 1989 are presented in Table 3.2. Clubs have been ranked according to mean spending per member.

Table 3.2 shows that mean spending by experimental and control town members of chartered, golf, lawn bowling, and rugby football clubs was consistently higher than by members of social, sports, and squash clubs. Of particular note was mean annual spending by experimental and control town members of chartered, bowling, and rugby football clubs. This result indicates that patterns of consumption by members in chartered, bowling, and rugby football clubs may be influenced by the context for drinking despite hotel closures in experimental towns.

Drink-driving offences

To examine further the effects of hotel closures, records of drink-driving offences in the police areas of experimental and control towns were obtained. Drink-driving offences were

3.3 Mean absolute alcohol on the last drinking occasion (top panel) and mean absolute alcohol on each drinking occasion (bottom panel) by experimental (A and B) and control town (C and D) residents converted into offences per 1,000 in order to equate differing population sizes in each town. Drink-driving offences per 1,000 in the police area of each town are presented in Table 3.3, for the two periods, 1986/87 and 1988/89.

Table 3.3 shows that drink-driving offences in experimental Towns A and B decreased during hotel closures. Drink-driving offences in control Towns C, D, E and F increased during hotel closures. Of particular importance was the possible relocation of drinkers from experimental towns to control towns. Drink-drivers returning from control areas could have been revealed in experimental town figures. With a return journey of 8 to 30 kilometres into each experimental town police area, and only one arterial road into each town, detection by police patrols was very easy. The reduction in drink-driving figures in experimental town police areas (Table 3.3) is therefore consistent with the possibility of no relocation of drinkers to the control towns, although offences in these areas increased. When drink-driving offences before and after hotel closures were combined for the police areas in each group of towns (Table 3.3) the number of offences per 1,000 in experimental towns was significantly less than in control towns; $X^2(1, N=57) = 10.92, p< .001$.

Interviews

Experimental and control town residents were interviewed to determine whether consumption followed changes in liquor sales. For each person interviewed, two dependent measures were derived from responses to questions about drinking, each translated into milligrams of absolute alcohol equivalent. These were (1) absolute alcohol on the last drinking occasion, (2) absolute alcohol on each drinking occasion for all previous drinking occasions recalled for the previous month. A drinking occasion was defined as an episode when one or more alcoholic drinks were consumed. Figure 3.3 (top panel) shows that the mean absolute alcohol consumed on the last drinking occasion by residents in the experimental towns (A and B) was less than by those in control towns (C and D). When the measures were combined for residents in each pair of towns the difference in mean absolute alcohol on the last drinking occasion for the experimental

3.4 Experimental and Control town residents drinking occasions exceeding 80 mgs of absolute alcohol

towns ($M = 40.32$) was significantly less than for the control towns ($M = 96.15$); $t(78) = 3.20$, $p < .01$.

Figure 3.3 (bottom panel) shows that the mean absolute alcohol consumed on each drinking occasion in the last month (a total of 134 for all towns combined) was less for residents in experimental towns than for residents in the control towns. When measures were combined for experimental and control town residents mean absolute alcohol consumption on each drinking occasion was significantly less for experimental towns ($M = 37.87$) than for control towns ($M = 92.20$); $t(78) = 2.94$, $p < .01$. It is notable that the mean absolute alcohol consumed on each drinking occasion by control town residents was well above the legal drink-driving limit of 80 milligrams of absolute alcohol.

Further analysis of responses concerning previous drinking occasions in the past month showed there were no differences between individual towns in the frequency of reported drinking occasions (Table 3.4). In each town, relatively few residents reported more than one drinking occasion for the last month (Table 3.4). Consistent with the high level of absolute alcohol consumption (Figure 3.4) by control towns residents there were marked differences in the frequency of drinking occasions when more than 80 milligrams or less than 80 milligrams of absolute alcohol were consumed.

Figure 3.4 shows that for residents of control towns there were about as many occasions when less than 80 milligrams of absolute alcohol was consumed as there were when more than 80 milligrams of absolute alcohol was consumed for the last drinking occasion. Individuals for whom there were no drinking occasions did not contribute to the analysis. For residents of experimental towns, however, there were many more occasions when the alcohol consumed was less than 80 milligrams than when it was more than 80 milligrams $X^2(1, N=71) = 17.09$, $p < .001$. Therefore while the overall frequency of drinking was similar for residents of experimental and control towns, residents in experimental towns generally consumed less alcohol on the last drinking occasion.

3.5 Mean dollars spending each week

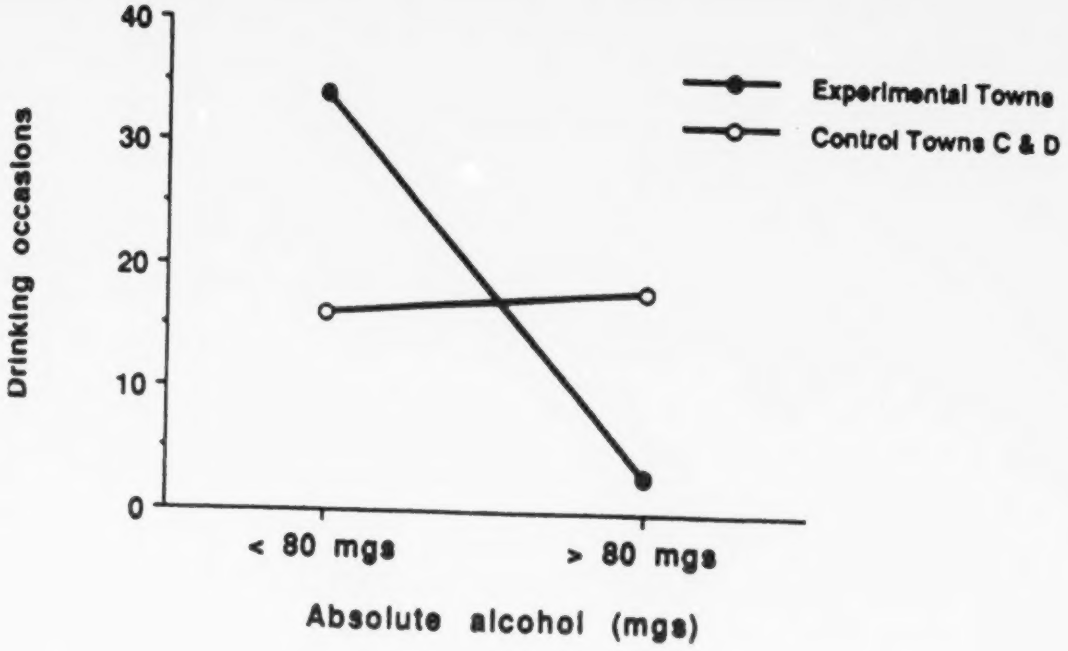
Consistent with the conclusions for Figure 3.3 and 3.4, Table 3.5 shows that residents in the experimental towns reported "getting drunk" less frequently than residents in control towns; $X^2(3, N=80) = 18.80, p < .05$.

Figure 3.5 shows that the mean reported spending each week on liquor was less for residents in experimental towns than for residents in the control towns. When spending each week was combined for experimental and control towns mean spending each week was significantly less for experimental towns (*M* = $13.42) than for control towns (*M* = $27.92); $t(78) = 2.501, p < .05$.

In view of the unavailability of off-license outlets in Towns A and B, after hotel closures, it was of interest to know where residents drank, and where they purchased their liquor supplies. Residents were therefore asked about the location of the last drinking occasion, and where they purchased (take-home) liquor supplies before and after hotel closures. Residents' location of drinking and purchases of liquor before and after hotel closures is presented in Table 3.6. Town A and B residents (Table 3.6 top panel) shows residents used to drink at their hotel. After the hotel closure residents drank at home, or a club. In both control Towns C and D residents drank at their local hotel, or at home and did not change their pattern of location over the two year period.

Table 3.6 (bottom panel) shows off-license buying patterns before and after hotel closures. Few Town A residents purchased off-license supplies from their hotel, where liquor was sold at retail prices. Most residents drove the 12 kilometres each week to the supermarket in Town E and purchased wholesale off-license liquor supplies in Town E. Before the Town B hotel closure some residents purchased their off-license liquor supplies from wholesale outlets in Town C (an 8 kilometres drive) because the Town B hotel sold off-license liquor at retail prices. Again most Town B residents travelled to Town E (30 kilometres drive) for weekly shopping and purchased wholesale off-license liquor supplies in Town E. In both control Towns C and D residents purchased wholesale off-license liquor at their hotel outlet, or the wholesale outlet in Town E.

3.6 Mean absolute alcohol on the last drinking occasion (top panel) and Mean absolute alcohol consumption on each drinking occasion (bottom panel) by experimental and control town contexts for drinking



40
30
20
10
0
Drinking occasions
< 80 mgs
> 80 mgs
Absolute alcohol (mgs)
Experimental Towns
Control Towns C & D

Table 3.4 Frequency of reported drinking occasions

Drinking occasions	1	2	3	4 or more
Town A	17	2	0	1
Town B	14	3	0	3
Town C	15	3	1	1
Town D	15	2	1	2

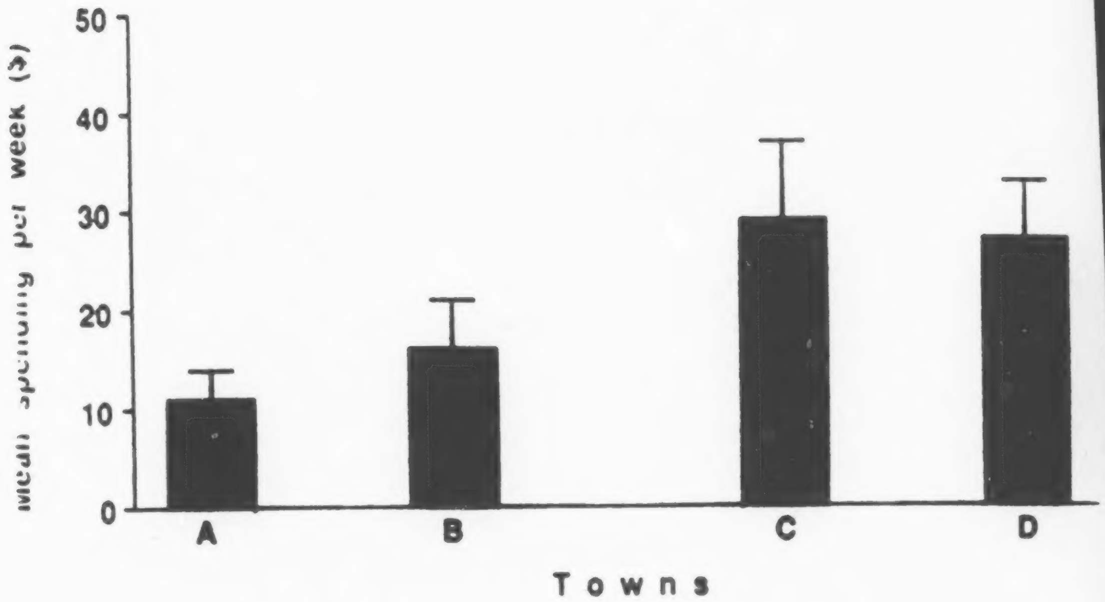
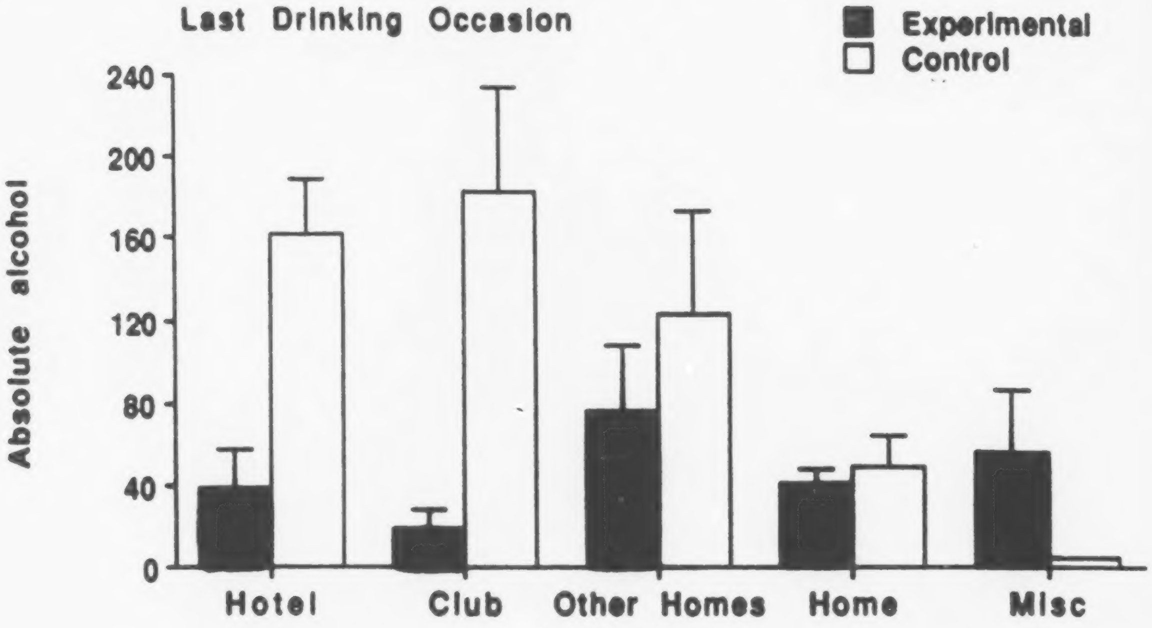

Mean spending per week ($)
50
40
30
20
10
0
A
B
C
D
Towns

Table 3.5 Frequency of drunkenness for experimental and control town residents

Towns	Weekly	Monthly	Yearly	Almost /never
Experimental	1	7	18	14
Control	10	8	9	13


Last Drinking Occasion

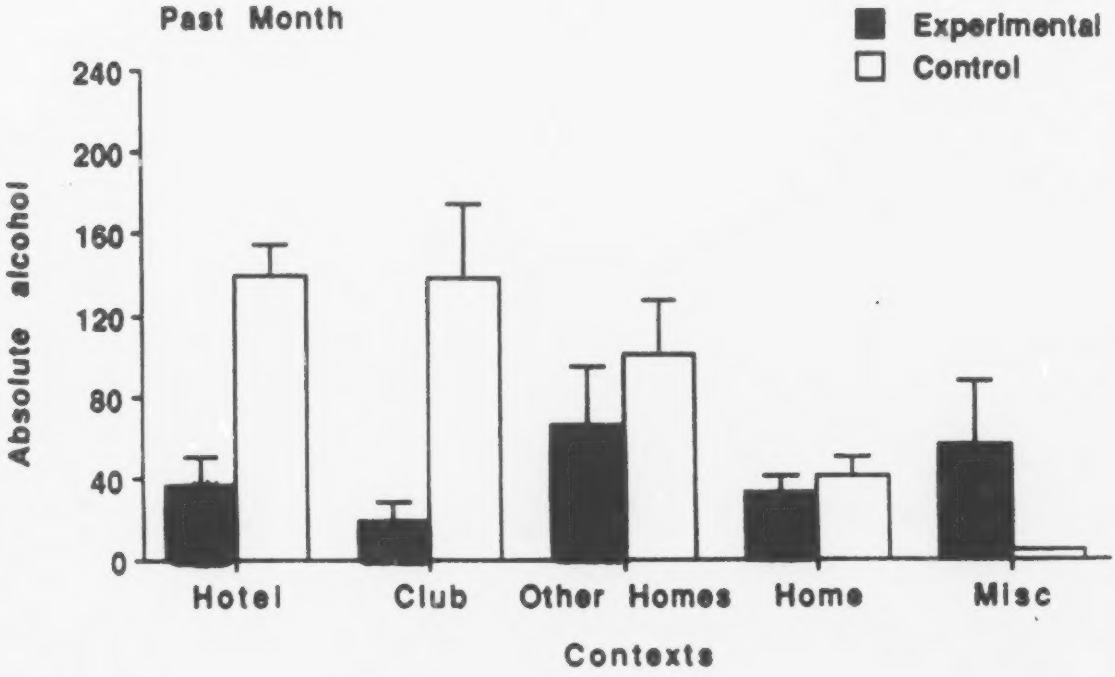

Past Month

Table 3.6 Location of drinking and off-license purchases of alcohol

Location	TownA		Town B		Town C		Town	
	before	after	before	after	before	after	before	after
Drinkign Location								
Hotels Town A	15	-	-	-	-	-	-	-
Hotel Town B	-	-	10	-	-	-	-	-
Hotel Town C	-	-	-	-	14	14	-	-
Hotel Town D	-	-	-	-	-	-	13	13
Hotels Town E	-	-	1	-	-	-	-	-
Hotel Town F	-	-	-	-	-	-	-	-
Home	3	13	5	13	4	4	5	5
Town Clubs	-	5	2	6	1	1	1	1
Clubs Town E	1	1	-	-	-	-	1	1
Don't buy/drink	1	1	1	1	1	1	-	-
Off-license Purchases location								
Hotels Town A	4	-	-	-	-	-	-	-
Hotel Town B	-	-	3	-	-	-	-	-
Hotel Town C	-	-	6	7	14	14	-	-
Hotel Town D	-	-	-	-	-	-	13	12
Hotels Town E	15	18	10	12	2	2	6	7
Hotel Town F	-	1	-	-	-	-	-	
Don't buy/drink	1	1	1	1	4	4	1	1

Contexts for drinking

Liquor sales and interview responses suggest that the context for drinking may have mediated changes in patterns of consumption in experimental towns following reduced alcohol availability. The responses of experimental town residents showed a change from drinking at their hotel to drinking at home. Further analysis of the contexts for drinking by experimental and control town residents was conducted.

The number of residents who reported their last drinking occasion at home, in hotels, other homes, clubs, and miscellaneous contexts, were respectively 28, 14, 10, 13, and 6. A further 9 residents who could not remember having had a drink in the last month, or who did not drink, were not included in the analysis of contexts. Mean absolute alcohol consumption in a context was calculated for those persons drinking in that context on their last drinking occasion. Mean absolute alcohol consumption on each drinking occasions in the four contexts was calculated by dividing total absolute alcohol by the number of persons drinking in each context. Only two residents reported multiple drinking contexts during a drinking occasion.

Mean absolute alcohol consumption on the last drinking occasion by experimental and control town residents in hotels, other homes, clubs, at home, and miscellaneous contexts (a Marae - on the grounds of a Maori meeting house, at restaurants, or workplace) is presented in Figure 3.6 (top panel). Mean absolute alcohol on the last drinking occasion reveals two important patterns of consumption during hotel closures. First, there were different patterns of consumption in hotels and clubs by experimental and control town residents. Second, control town residents exceeded the legal drink-driving limit of 80 mgs of absolute alcohol more often in the four contexts for drinking.

Figure 3.6 (top panel) shows that mean absolute alcohol consumption on the last drinking occasion in hotels by experimental town residents ($\underline{M}$ = 38) was significantly lower than consumption in hotels by control town residents ($\underline{M}$ = 162); $\underline{t}(12) = 3.95$, $p < .002$. Similarly, mean absolute alcohol consumption in clubs on the last drinking occasion by experimental town

Table 3.7 The number of drinks above or below 80 mgs of absolute alcohol in each context for drinking

	Hotels	Clubs	Other Homes	Home	Misc
Experimental					
Below 80 mgs	5	7	5	40	4
Above 80 mgs	1	0	2	1	1
N	6	7	7	41	5
Control					
Below 80 mgs	3	5	3	22	1
Above 80 mgs	17	6	6	5	0
N	20	11	9	27	1

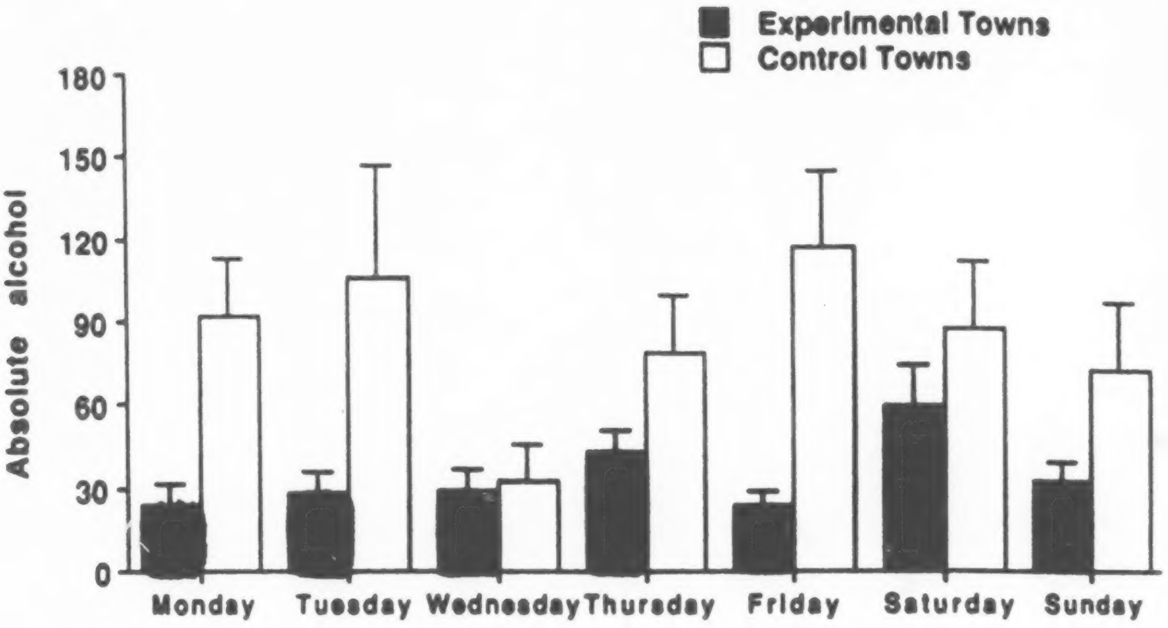
residents (M = 19) was significantly lower than consumption in clubs by control town residents (M = 182); t(11) = 4.90, $p < .001$.

Mean absolute alcohol on each drinking occasions in the previous month (a total of 134) by experimental and control town residents (totals respectively of 68, 26, 16, 18, and 6) at home, in hotels, other homes, clubs, and miscellaneous contexts is presented in Figures 3.6 (bottom panel). Figure 3.6 (bottom panel) shows that mean absolute alcohol consumption in hotels on each drinking occasion by experimental town residents (M = 36) was significantly lower than consumption in hotels by control town residents (M = 135); t(24) = 3.75, $p < .001$. In addition, mean absolute alcohol consumption in clubs by experimental town residents (M = 19) was significantly lower than consumption in clubs by control town residents (M = 138); t(16) = 4.50, $p < .001$. These data strongly suggest that patterns of consumption in experimental towns were mediated by the context for drinking. In particular, mean absolute alcohol consumption was very similar at home and other contexts by both experimental and control town residents (Figures 3.6). Absolute alcohol consumption in miscellaneous contexts remained unchanged in Figure 3.6.

As shown above absolute alcohol consumption by control town residents was consistently higher in hotels and clubs. Of particular note however, was the number of drinking occasions that exceeded 80 mgs of absolute alcohol; the legal drink-driving limit. The number of drinking occasions above or below 80 mgs of absolute alcohol by experimental and control town residents is presented in Table 3.7. Table 3.7 shows that there were five drinking occasions experimental town residents exceeded the drink-driving limit. Control town residents exceeded the limit on 34 drinking occasions. Control town residents in hotels, clubs, and other homes exceeded the drink-driving limit on most drinking occasions. In both experimental and control towns, residents drinking at home were least likely to exceed the 80 mg limit. The frequency (Table 3.4) and number of drinking occasions reported by experimental (65) and control town residents (69) was similar.

Days of drinking

3.7 Mean absolute alcohol each day of the week in experimental and control towns


Experimental Towns
Control Towns
Absolute alcohol
180
150
120
90
60
30
0
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

Does day of the week provide a temporal context for drinking? Mean absolute alcohol each drinking occasion on each day of the week in experimental and control towns is presented in Figure 3.7. Most drinking occasions in experimental and control towns occured between Friday and Saturday and declined on Sunday when hotels closed and only clubs were permitted to sell liquor. On Friday, and also earlier in the week, consumption by residents in control towns was greater than consumption by experimental town residents.

In summary, liquor sales showed a marked decrease in two experimental towns whereas the gradual annual increase in the four towns was maintained. Interview responses confirmed sales data in that for experimental town residents there was a significant reduction in consumption on the last and each drinking occasion. In addition, residents reported spending less and getting drunk less often. There was no difference in the frequency of drinking occasions by experimental or control town residents, but less was consumed by experimental town residents. These changes appear to have been mediated by the context of drinking. In control towns, residents consumed more in hotels and clubs. Absolute alcohol consumption in control town hotels and clubs was significantly above the legal drink-driving limit in compared to that in experimental towns. However, in all towns drinking at home and other contexts mediated lower levels of consumption. Drink driving offences also decreased in experimental towns, when compared with offences in the two years before hotel closures.

DISCUSSION

The closure of hotels in Towns A and B presented a unique opportunity to study the impact of reduced alcohol availability on consumption. The present research involved a naturalistic experimental study in a small region of New Zealand. The sole hotels in two towns were demolished, one after a fire, and one after an earthquake. Hotel closures in these "experimental towns" reduced alcohol availability with the loss of sole off-license (take-home) retail outlets, and a reduction to limited hours on-license club bar sales. The reduction in availability resulted in a marked decrease in liquor sales in the experimental towns. In contrast the liquor sales in four towns (C to F), where availability remained the same, showed a small increase over the same period. The reduction in liquor sales in Towns A and B indicates that reduced alcohol availability may have had a major effect on total alcohol consumption in Towns A and B. This conclusion is supported by the concomitant reduction in drink-driving offences by experimental town residents and by interview data.

Interview responses by the residents in both experimental and control towns were consistent with liquor sales figures. Following the reduction in alcohol availability residents in the experimental towns reported lower consumption than control group residents on the last and each drinking occasion in the last month. In addition, residents in experimental towns reported spending significantly less each week on alcohol, and getting drunk significantly less often than residents in control towns. Alcohol consumption by residents in the experimental towns, measured by total liquor sales, absolute alcohol on the last reported drink, reported frequency of drunkenness, and reported expenditure each week on alcohol showed a marked decrease as a result of the reduction in alcohol availability, compared to consumption by residents in the control towns.

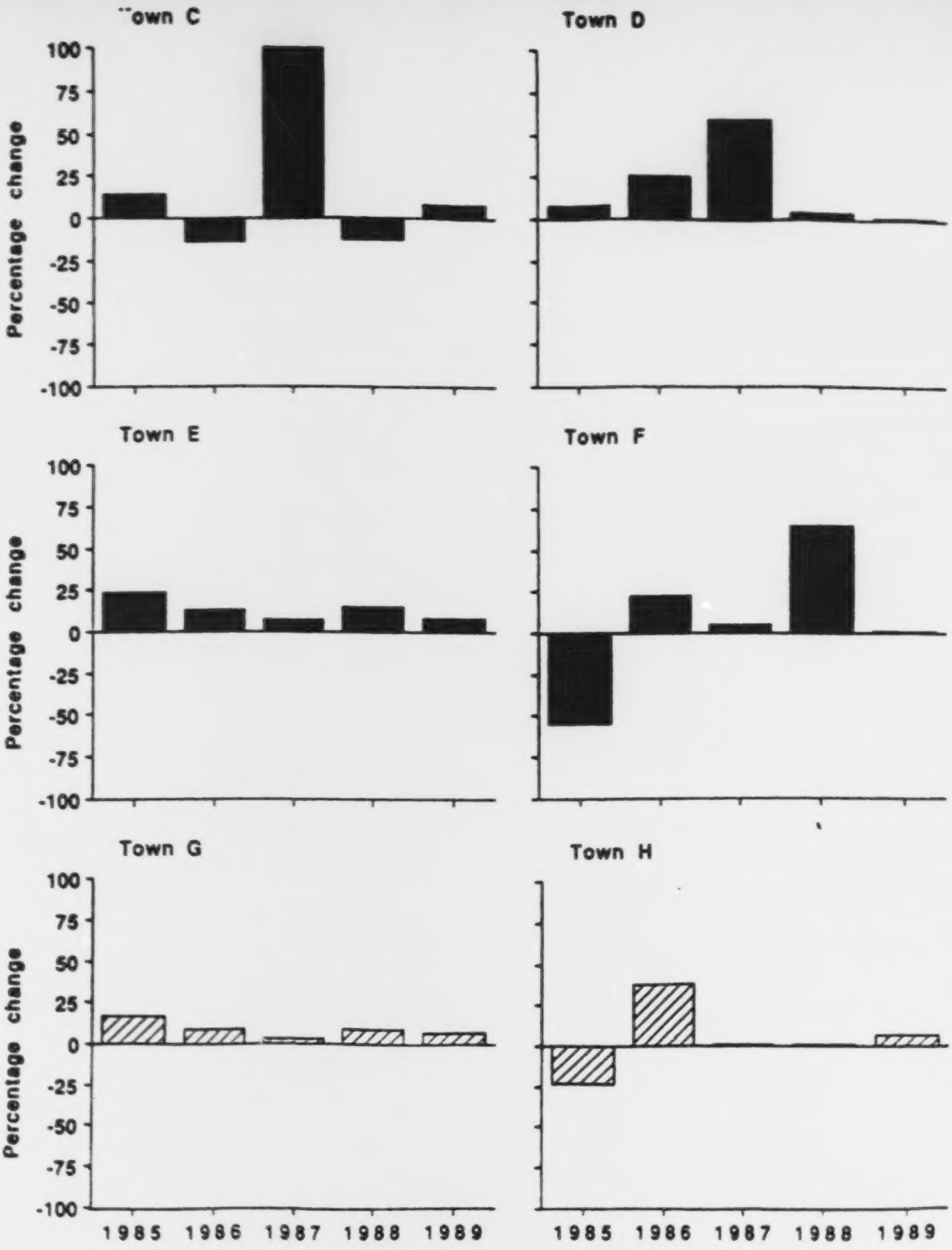
The reduction in total consumption in the experimental towns appeared to reflect a change in the patterns of consumption. Despite the reduction in consumption indicated by sales figures and interview responses by experimental town residents there was little difference between the frequency of drinking occasions by residents in both experimental and control groups. Therefore the change was in the patterns of consumption, with less alcohol consumed per drinking occasion under conditions of reduced alcohol availability. The changed patterns of consumption and reduction in consumption due to reduced alcohol availability was demonstrated by differences in the number of drinking occasions that exceeded 80 mgs of absolute alcohol, the legal drink-driving limit in New Zealand. In the control towns, there were equal frequencies of occasions when less than 80 mgs of absolute alcohol was consumed as when more than 80 mgs of absolute alcohol was consumed. In the experimental towns, however, there were relatively few occasions when more than 80 mgs of absolute alcohol was consumed.

This is particularly noteworthy as changes in patterns of consumption and lower levels of consumption in the experimental towns appeared to be associated with alcohol availability, and with the context for drinking. Previous studies have also suggested that alcohol availability and the context for drinking may be important factors in that some contexts are high risk venues for increased alcohol consumption.

Alcohol availability research using correlational and regression analysis of the effects of the number of outlets on consumption has shown mixed results (Ashley, & Rankin, 1988; Farrell, 1985; MacDonald & Whitehead, 1983; Smith, 1983; Single, 1988). A possible explanation for these mixed results may be that many studies of alcohol availability have failed to consider the type of outlet or context for drinking. Most alcohol availability studies have represented types of outlets as on-license, off-license, or the total number of outlets. An increase in off-license liquor outlets is often associated with increased consumption (MacDonald & Whitehead, 1983). Only two studies showed a correlation between increased on-license alcohol availability and consumption (see reviews by Smith, 1983; Single, 1988). A more recent study (Holder & Blose, 1987) found a 6-7% increase in liquor sales following increased on-license outlets in experimental counties. Studies considering the total number or density of outlets have also found a positive relation with consumption (Single, 1988). The present study provided further evidence that if there is a reduction in the number of outlets consumption will decrease. This finding is consistent with the results of data from other much shorter interruptions of supply (e.g., strike) in Finland (Makela, 1980), Norway (Horverak, 1983), Canada (Smart, 1977) and New Zealand (Brown, 1978).

National surveys of drinking occasions in the United States (Clark, 1981a; Clark, 1985), Scotland (Dight, 1972), and New Zealand (Martin, 1984; Stewart, & Casswell, 1986) indicate that the most frequent context for drinking is at home, with drinking occasions in hotels, clubs, and other homes, being less frequent. However, as further proof of the high risk nature of some contexts for drinking, the frequency of drinking in unlicensed premises did not necessarily indicate higher consumption in these contexts. Just as some contexts for drinking appear to mediate increased consumption, some contexts mediate lower levels of consumption. When surveys analysed the amount consumed in each context, patrons in hotels, clubs, or licensed premises often exceeded the legal drink-driving limit. In a national New Zealand survey, one in three drinking occasions that exceeded 80 mgs of absolute alcohol occured in licensed hotels/taverns and clubs (Stewart, & Casswell, 1986). Data from a 1979 national survey (N= 5651) in the United States also showed that taverns, bars, and cocktail lounges, mediated higher consumption even by light drinkers. Clark (1985) reported that light and heavy drinkers consumed more alcohol when in taverns, bars, or cocktail lounges than any other context for drinking. In another study (Fitzgerald, & Mulford, 1986), consumption was compared across seasons and contexts for drinking between 1979 and 1980. The authors found that the frequency of reported drinking occasions in hotels, clubs, other homes, miscellaneous contexts, and at home was stable across all seasons of the year. The only increase in drinking occured during summer, or at summer sporting events, and was accompanied by a corresponding increase in liquor sales (Fitzgerald & Mulford, 1986). In the present study, the frequency of drinking remained unchanged following reduced alcohol availability, although unlicensed contexts of drinking mediated lower levels of consumption

3.8 Percentage changes in liquor sales year to year in four control towns and two distant towns (G and H).



Town C
Town D
Town E
Town F
Town G
Town H
Percentage change
100
75
50
25
0
-25
-50
-75
-100
1985
1986
1987
1988
1989

in experimental and control towns. The present result is therefore consistent with previous results in suggesting that licensed premises may be high-risk venues for increased alcohol consumption.

The importance of the context for drinking in future research has been emphasised by recent reviewers (Moskowitz, 1989; Holder, 1988; Room, 1984; Single, 1988). Holder (1988) noted that future research on the context for drinking should consider the type of patrons who frequent different contexts for drinking. Single (1988) concluded that future research should focus on the context for drinking, the behavior of servers, and how the alcohol industry should accept greater social responsibility for alcohol-related costs of alcohol consumption. Room (1984) and Moskowitz (1989) noted the importance of research into contexts for drinking if adequate primary prevention policies and interventions are to be formulated. Further research on the mediating effects of contexts for drinking in clearly warranted.

It may be argued that results of the present study are limited because the experimental and control towns were not independent units owing to relocation of drinkers from experimental towns to control towns. The question of relocation of drinkers centres on control towns. If relocation occurred the percentage change in liquor sales in control towns would show a large increase, particularly when compared to liquor sales in very distant towns to which relocation was not possible or highly unlikely. The percentage change from year to year in the four control towns, and also in two distant towns (G and H) is presented Figure 3.8. Towns G and H were of similar population to town E (about 30,000) and were over 400 kilometres from the region under study.

During, the year to March 1988 that Town B hotel was close, Towns C and D showed negative or slight increases in sales, the rate of change in Town E remained constant. Town F showed an increase in the rate of change, but relocation to Town F was unlikely because residents of Town B had to travel through Town C, which had a wholesale off-license facility, to reach Town F. During the year to March 1989 when both Towns A and B hotels were closed, none of the control towns showed a clear increase in percentage change of sales.

The fluctuation in percentage change of sales in the control towns did not differ systematically from the changes in the two very distant Towns G and H. In particular, the pattern of change for Towns E and G (both with about the same population) were very similar. Changes in liquor sales from year to year in the control towns, especially when compared to two very distant towns, therefore provided no evidence to support the possibility that drinkers in experimental towns relocated to the control towns.

It might be argued that the size of the single point survey in the present study (N=40 in each experimental and control group) was insufficient to draw strong conclusions about consumption. We argue, however, that the evidence from several different aspects of the study converge to support our conclusion. Interview responses confirmed the liquor sales data and drink-driving data. The interviews also helped determine, whether contexts for drinking changed following hotel closures. Despite the relatively small sample in the experimental and control towns the converging lines of evidence point to the conclusions that (1) consumption by experimental town residents was consistently less than control towns during hotel closures, and (2) the context for drinking mediated decreased consumption in experimental and control towns. Additionally, (3) the interview responses were consistent with a reduction in alcohol consumption without relocation of drinking. That is, experimental town residents reported lower spending per week on alcohol, less frequent drunkenness, and changed contexts for drinking.

It could be asked whether the earthquake affected alcohol availability in Town B differently from Town A. But interview responses from residents in Towns A and B and liquor sales figures for the individual towns were very similar. Further, of the control towns, Town C sustained some earthquake damage, and Town D sustained no damage (Muller, 1987), and there were no consistent differences in sales and interview responses between Town C and Town D. There is therefore no evidence that the earthquake affected consumption other than through its effects on alcohol availability.

In conclusion, the present study demonstrated that a reduction in alcohol consumption as a result of reduced alcohol availability was manifest not as a reduction in the frequency of drinking, but in the amount consumed per drinking occasion. In particular, the pattern of consumption altered in that the context for drinking moved from the hotels, to clubs and homes. This conduct change appeared to mediate reduced consumption by experimental town residents. The context for drinking may therefore be a major determinant of alcohol consumption in that it mediates different patterns of consumption.

Chapter 4

Crime and Alcohol Availability

Previous investigators have looked at many types of criminal offences in order to determine alcohol involvement in crime. Hore (1988) asked whether studies that showed fluctuations in consumption also showed corresponding fluctuations in crime rates. For example, when minimum purchase age was lowered in 3 Australian States, juvenile crime increased (Smith & Burvill, 1986ab). A second method of studying the relation between crime and alcohol investigated whether the offender, or more recently, the victim, had been drinking (Hore, 1988). Such studies have either concentrated on interviews of imprisoned persons, or have used recorded information such as police files, medical records, blood alcohol analysis, and prison records.

Early studies of alcohol involvement and victim offences investigated homicides, rape, and serious assaults. Overseas studies using police records of aggravated assault cases (use of a weapon) found that at the time of the offence 24% of offenders and 25% of victims had consumed alcohol (Pittman & Hardy, 1964). Thum, Weshler, and Demone, (1973) interviewed 5622 patients receiving hospital emergency treatment. They found breathalysed alcohol was higher among patients treated for fighting and assault injuries than patients treated for motor vehicle accident. In another study, interviews of 10,000 prison inmates showed alcohol was present among 53% of homicides, 61% of assaults, 39% of robberies, 47% of burglaries, 46% of car thefts, 38% of forgeries, and 67% of arson (Roizen & Schneberk, 1977).

More recently, attitudes to drink-driving as a criminal offence have been changing. Today many people would consider drink-driving a crime if a driver caused an injury, serious accident, or fatality (Wilson & Herrnstein, 1986). Even resistance to the introduction of random breath testing has decreased. Such changes in social support for random breath testing as an intervention strategy have developed over many years (Snortum, 1988). Evaluation of drink-driving as a type of offence has continued in many countries including New Zealand (Clark-Reynolds, 1987, 1989), Australia (Smith, 1986; Smith & Burvill, 1986ab), and the United States (Lund & Wolfe, 1989; O'Malley & Wagenaar, 1991; Wagenaar, 1986; Zador, Lund, Fields, & Weinberg, 1988).

In this chapter I consider studies of specific types of crimes and alcohol involvement including homicide, rape and sexual offences, juvenile crime, and also crime research in New Zealand.

Homicide

Alcohol involvement in homicides has intrigued researchers for decades. There have been at least 28 different studies of alcohol involvement in homicides. Fourteen of these studies found alcohol present in at least 60% of the cases (Greenberg, 1981). Most researchers found alcohol evident in victims and offenders. One psychiatric study, in which imprisoned persons were interviewed, suggested that 70% of homicide offenders and 25% of victims had consumed alcohol before the offence (Gillies, 1965). Hollis (1974) examined medical files of blood alcohol data from 372 homicide victims and 50 offenders. In 88% of cases, offenders had been drinking, and in 80% of cases both victim and offender had been drinking. On the other hand, in another psychiatric case study of 50 murderers, only 22% of offenders had been drinking before the offence (Scott, 1968). In one study that examined police files of 588 homicides, fewer than 11% of offenders and 8% of victims had consumed alcohol (Wolfgang & Strohm, 1956).

What is evident about many studies of homicide and possible alcohol involvement is the importance of the use of reliable measures of alcohol consumption. When a reliable measure of alcohol involvement was used, for example, blood alcohol levels in offenders and victims, the studies report the highest level of alcohol involvement in homicides. When less reliable measures of alcohol involvement were used, such as self-reports, interviews, and case records, these studies showed alcohol was less likely to be involved in homicides. Greenberg (1981) noted three major problems with self-report sources of crime data. First, forgetting maybe evident after long delays. A second source of error is that if the victim or offender was drinking at the time of the crime then they may not have encoded the event accurately. A third problem is that investigators or psychiatric assessments may only ask general questions about alcohol involvement during the offence as it is not the primary purpose of their interview (Greenberg, 1981).

Researchers have also noted that many homicides and sexual offences occured on weekends, suggesting a relationship with weekend drinking patterns, when alcohol consumption increases (Amir, 1967; Wolfgang & Strohm, 1956). In a New Zealand study, 76% of drinking occasions occured between Friday and Sunday (Martin, 1984). In Chapter 3 of the present research, 65% of drinking occasions occured between Friday and Sunday. Recent research in Denmark (Thomsen et al., 1989) and the United States (Welte & Abel, 1989) has shown that a significant number of homicides occured on weekends, at nighttime, and that high blood alcohol was recorded, especially in victims. Women appeared particularly vulnerable to sexual offences during Saturday evenings (Amir, 1967). In the Denmark study, almost 50% of homicide victims (22/45) had high (>0.5 mgs) blood alcohol concentrations (Thomsen et al., 1989). In the U.S. study, 64% of Saturday homicides victims and 57% of Sunday homicides victims had raised blood alcohol levels (Welte & Abel, 1989). By comparison, raised blood alcohol was found in only 5% of homicides on Tuesday afternoons. A highly significant correlation between time of day and days of the week suggested that alcohol was a causal factor in homicides, particularly if victims had also consumed alcohol (Welte & Abel, 1989).

Rape and sexual offences

The relationship between alcohol and rape has not been as extensively studied as that between alcohol and homicide. Greenberg (1981) reviewed nine published studies investigating the association between alcohol involvement and sexual offences; usually forced rape. In many cases both the victim and offender had been drinking. In 34% of 646 rape cases both victims and offenders had been drinking (Amir, 1967). Amir also found evidence for a relation between alcohol and the level of sexual violation in rape files. Amir (1967) suggested that there was significant relationship between alcohol and increased rape on weekends because there was more leisure time and increased alcohol consumption on weekends. In a Canadian study of rape cases between 1966 and 1975, in 72% of cases both the victim and offender had been drinking (Johnson, Gibson, and Linden, 1978). Another study found that in 35% of cases convicted rapists were alcoholics, and 50% had been drinking at the time of the offence (Rada, 1975). In a New Zealand study of rape and sexual assault, over one third of women had been intoxicated at the time of the offence (Goodyear-Smith, 1989). However, one problem with reporting sexual offences is that of alleged consent by the victim. Goodyear-Smith noted the disturbing statistic that alleged consent is more difficult to disprove if physical trauma is not part of the offence. That is, fewer offences went to court if the woman avoided physical trauma. In cases when obvious physical trauma occured during sexual offences alleged consent was more difficult to maintain as a defence (Goodyear-Smith, 1989). Therefore sexual offences may be under-reported in public records.

Juvenile Crime

Smith and Burvill (1986ab) investigated the effects of "increased alcohol availability" on juvenile crime, and traffic crashes and fatalities, resulting from the lowering of minimum purchase age from 20 to 18 years of age in three Australian states. They reported significant increases in juvenile crime (under 18 years of age), and traffic crashes and fatalities. In Queensland State total female juvenile crime increased significantly, and male burglaries, theft, motor vehicle theft, fraud, and drunkenness also increased. In South Australia juvenile female crime increased, and male burglaries, theft, motor vehicle theft, and drunkenness also increased. In Western Australia female juvenile crime, and male juvenile serious assaults, theft, motor vehicle theft, and fraud increased significantly. Lowering the drinking age had the same adverse effect on traffic crashes in these three Australian states. Based on these findings the authors stated that it is not unreasonable to conclude that raising the drinking age would lead to a reduction in male juvenile crime and traffic crashes and fatalities (Smith & Burvill 1986b). North American studies have found that raising the minimum purchase age from 18 to 20, or 21, was associated with reductions in juvenile drink-driving crashes and fatalities (Du Mouchel, Williams & Zador, 1987; Hingson, Scotch, Mangione, Meyers, Glantz, Heeren, Lin, Mucatel, & Pierce; 1983; O'Malley & Wagenaar, 1991; Wagenaar, 1983; Wagenaar & Maybee, 1986; Williams, Zador, Harris, & Karpf, 1981).

The New Zealand situation

New Zealand Police have estimated that between 70% to 80% of offenders appear to have alcohol-related problems (Stewart & Casswell, 1986). The most common types of violence reported in New Zealand are abduction, robbery, firearms offences, serious and grievous assaults (a weapon used), and common assaults (N.Z., Police Digest of Statistics, 1985 to 1989). New Zealand studies of violent offending and alcohol involvement have shown generally higher percentages of alcohol intake by offenders than studies from Europe and North America. An early New Zealand study estimated that at least 50% of violent offenders had consumed alcohol before the offence (Schumaker, 1971). Another New Zealand study found that at least 84% of offenders interviewed reported drinking before the offence (Bradbury, 1984). New Zealand Police also report that in 90% of domestic disputes one or both parties had consumed alcohol (New Zealand Police Report to the Parliamentary Select Committee on violence, 1979). Considering New Zealanders' per capita consumption of beer, wine, and spirits is ranked among the top ten developed countries (Australian Department of Statistics, 1988; Orchard, 1986), it should not be surprising that 70% to 80% of offenders have alcohol-related problems.

The most recent report of violent offending in New Zealand (Bradbury, 1984) studied the drinking patterns of 167 convicted violent offenders using semi-structured interviews, police files, court files, probationer reports, and interviews with prosecution and defense council. Bradbury found a relationship between the context for drinking and acts of violence. Some hotels were more conducive to violent behavior. Interview data revealed that 84% of offenders admitted consuming alcohol before the violent offence. Nearly, 70% of violent offences in the sample occured on licensed premises, and 30% were in private dwellings. Bradbury concluded:

> "Thus the heavy drinking in locales that are policed, and a lifestyle that incorporated violence, combine to produce figures that suggest a high proportion of the violent events that come to official notice take place after the consumption of alcohol." (p. 96)

Researchers from the South Pacific Research Institute studied drinking and violence in hotels. In an early study there was a relationship between alcohol consumption and New Zealand hotel violence (Semu, 1976). In a later study there was an association between the seriousness of a violent offence and the social context (Graves, Graves, Sam, & Semu, 1979). Ethnic origin was not related to violent offences but size of drinking group and time spent drinking in hotels predicted the seriousness of offences (Graves, Graves, Semu, & Sam, 1981).

The only New Zealand study of alcohol availability and criminal offences investigated the social impact of decreased beer supplies following a six week strike by brewery workers (Brown, 1978). Brown found that following the reduction in alcohol availability, Friday-night vehicle crashes and injuries, weekly arrests for drunkenness, assault, offensive and disorderly behavior, obscene language, and fighting significantly decreased (Brown, 1978).

In summary, there is strong evidence that alcohol is linked with crime. Certainly, few studies have offered any contrary evidence against the association between alcohol and crime (Room, 1983). Regarding the impact of alcohol availability on crime, Room states,

> "The operational test for such a conditional causation becomes, Would the crime fail to take place if alcohol were removed from the situation (p.40). From a pragmatic policy perspective, the question of cause might well be rephrased to the question, Are crime rates affected by the level or patterning of alcohol consumption?" (p. 41).

The present chapter describes a naturalistic experiment to examine the effects of a change in alcohol availability on rates of offending in a small provincial region of New Zealand. Criminal offences in the two experimental towns (A and B) and the four control towns (C to F) described in Chapter 3 were compared.

METHOD

Design

The closure of hotels and reduction in alcohol availability offered the unique opportunity to study offending in the experimental towns (A and B) and four "control towns" (C, D & E, and F) where alcohol availability remained unchanged. Town D was included in Town E offences for the purposes of counting as it had no resident police and was served by the police from Town E. Inclusion of these four towns served as a control for changes occuring in experimental towns and gave complete coverage of offences in the region except for two isolated rural police areas 50 kilometres from Towns A and B.

Quarterly offence reports formed the basis of data analysis. These included all offences and serious offences from Town A to F before and after hotel closures. Closure of a hotel defined the beginning of the "after-closure" phase. If a quarter overlapped with the date of hotel closure, that quarter was excluded from analysis. Town A experienced reduced alcohol availability for 17 months and 20 days. After-closure offences for Town A were recorded for five quarters. In 1988, offences were recorded for Town A over four quarters as the hotel closed during the 4th quarter of 1987, and 1989 had one quarter before the new hotel opened. Town B experienced reduced alcohol availability for two years and nine months. For Town B in 1987, there were three quarters, four quarters in 1988, and 3 quarters in 1989 as a new hotel opened the end of that year. Town A offences for the 5 quarters "before and after hotel closures" were adjusted by multiplying each quarterly total by 8/5 to allow comparability of offences per 1,000 per annum. Offences were compared for nominal two-year periods before and after hotel closures, for the experimental and control towns.

Crime Data

Police records of criminal offences are established as follows. Each police officer codes and files a weekly offence report from daily diary offence records. Offences actioned may include, for example, referral of a young offender to the youth aid officer, or prosecution. Subsequent actions are made according to offence codes and noted as a clearance of that offence in quarterly and annual offence reports. Police computer personnel at district headquarters (Town E in this study) enter and verify offence data. All district headquarters have a computer link to the Department of Justice National Computer centre. Monitoring of types of offences, and modes of clearance, occurs at every policing level including each police station, district headquarters, and regional headquarters.

All offences are recorded under one of seven offence codes such as incidents of violence, sexual offences, drugs and antisocial behavior, dishonesty, property abuse, administration, or traffic offences. Police National Headquarters supplied summarized and detailed quarterly offence reports for all towns (A to F) in the region under study. Every offence, or attendance by police at an incident is recorded and coded. As part of the internal audit at each policing level, the number of offences and the later mode of action or clearance are required to balance each week. For this study, the seven offence codes were summarised into four similar offence types: victim, antisocial, property, and traffic offences. For each offence type, an offence was separately classified as a serious offence or "other" offence.

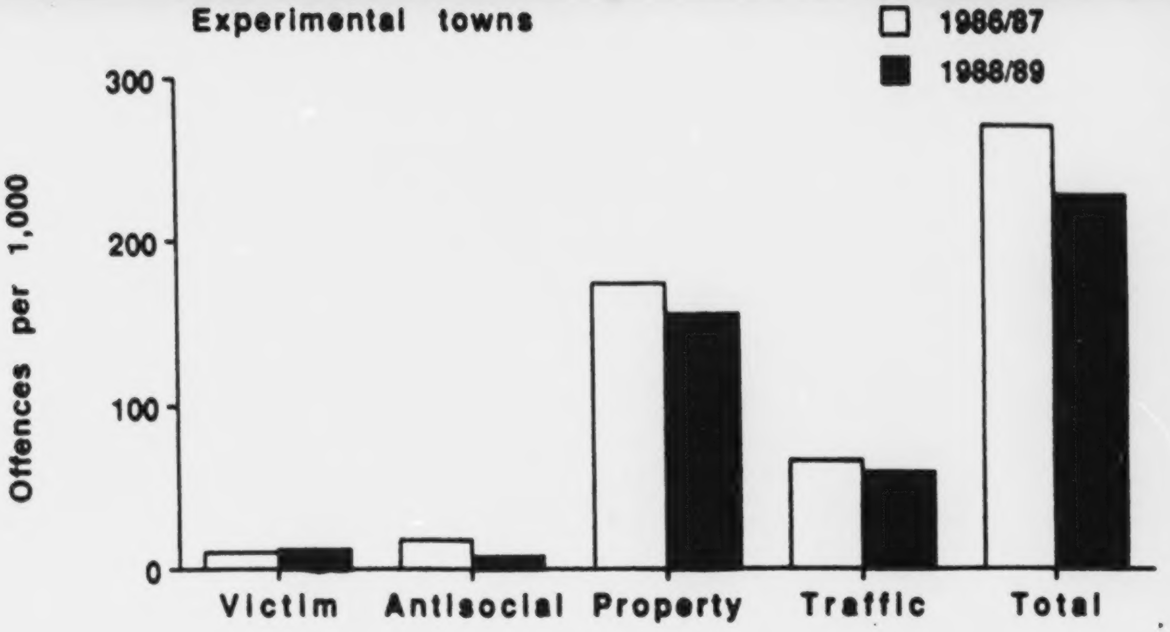
"Other" offences included victim offences, i.e., common assault (domestic assaults), and minor assaults with no weapons involved, threatening to use a weapon, and intimidation. In addition, victim offences included indecent exposure, and sexual offences that did not involve rape or abduction. Antisocial offences included disorderly behavior - fighting, throwing objects, breach of the peace, gambling and bookmaking, breach of a non-molestation order, and offensive language offences. Property offences included burglaries, car conversion, shop-lifting, theft, forgery, fraud, and the destruction or abuse of property.

Traffic offences included speeding, vehicle road worthiness, and causing an accident, injury or death with breath/blood alcohol below that indicating drink-driving. To take into account the different population sizes of each town, serious and "other" offences were expressed as offences rates per 1,000 per annum based on the 1986 population census of each town.

Serious offences

Serious offences were classified separately as victim, drug, arson, and drink-driving offences. Victim offences included aggravated robbery - involving a firearm or weapon, serious and grievous assault with intent to injure, and sexual offences - rape, child molestation, sexual abuse, and sexual violation. Drug offences included the supply, cultivation, possession, or importation of drugs. Arson offences were serious property offences that included the wilful setting fire to property or destruction of property, and property damage that might have endangered life. Drink-driving offences included driving or causing a crash, injury or death having excess breath/blood alcohol. Occurrence of these particular offence types and the number of offences in quarterly reports from police stations in Towns A to F were recorded separately for the two-year periods before and after hotel closures.

4.1 Mean offences per 1,000 per annum across experimental (A and B) and control towns (C, D & E, and F)


Experimental towns
☐ 1986/87
■ 1988/89
300
200
100
0
Offences per 1,000
Victim
Antisocial
Property
Traffic
Total

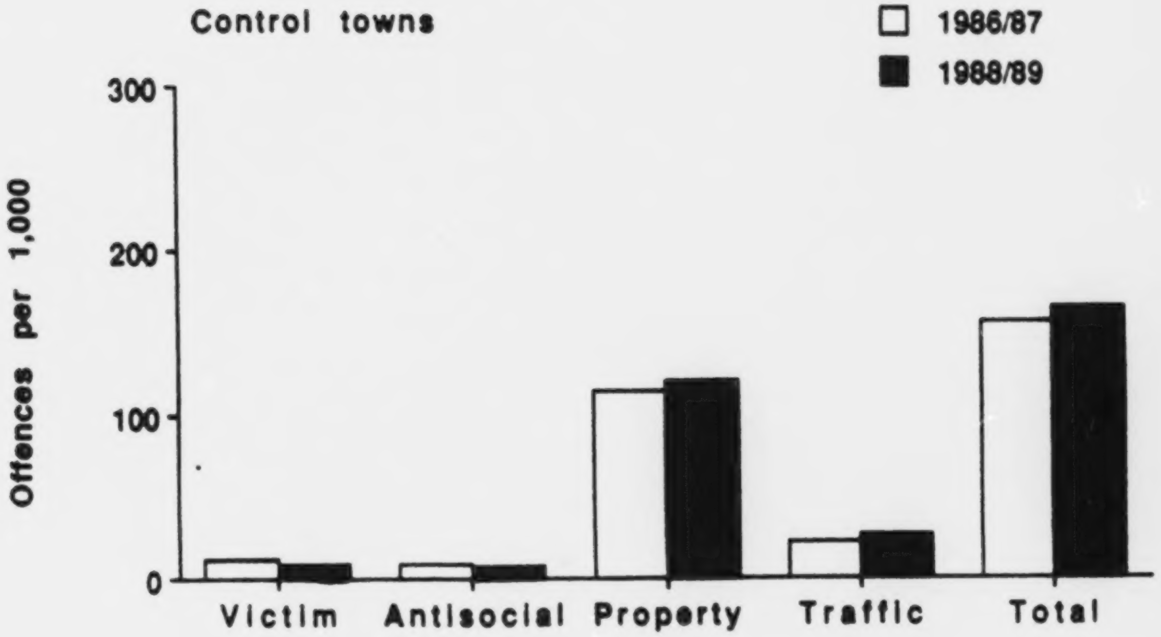

Control towns
☐ 1986/87
■ 1988/89
300
200
100
0
Offences per 1,000
Victim
Antisocial
Property
Traffic
Total

Table 4 1 Type of "other" offences per annum per 1,000 in experimental (A and B) and control towns (C, D and E, and F)

Towns	A			B			C			D & E			F		
	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	chang
Victim	16	16		5	5		8	6	-25%	5	5		7	7	
Antisocial	29	10	-65%	9	6	-44%	18	18		7	10	+30%	10	5	-50%
Property	171	178		180	128	-28%	180	184		82	77		81	99	+18%
Traffic	79	79		54	40	-25%	30	60	+50%	6	15	+60%	7	13	+46%

RESULTS

Figure 4.1 shows total "other" offences in experimental and control towns. In experimental towns total "other" offences declined from 263 per 1,000 before hotel closures to 211 after hotel closures. In control towns (Figure 4.1) the combined total "other" offences increased from 102 per 1,000 to 113 after hotel closures. This differential change between experimental and control towns was significant [2]; $X^2(1, N = 16804) = 58.30$, $p < .001$.

Figure 4.1 shows in experimental towns offences decreased after hotel closures due to reductions in antisocial, property, and traffic offences. In control towns offences increased due to increased property and traffic offences. Antisocial offences decreased significantly in experimental towns (A and B) compared with control towns (C, D & E, and F); $X^2(1, N = 1225) = 22.72$, $p < .03$. Property offences decreased in experimental towns and increased in control towns but these differences were not significance. Traffic offences, including speeding, reckless driving, and vehicle road worthiness offences decreased in experimental towns compared with control towns but again these differences were not significance.

Numbers of "other" offences in individual experimental and control towns (C to F) are presented in Table 4.1. Overall, offences decreased more in experimental towns and increased in control towns. For the purposes of clarifying changes in offences I used a criterion of 10% or greater change in number of offences in the different categories. For experimental towns

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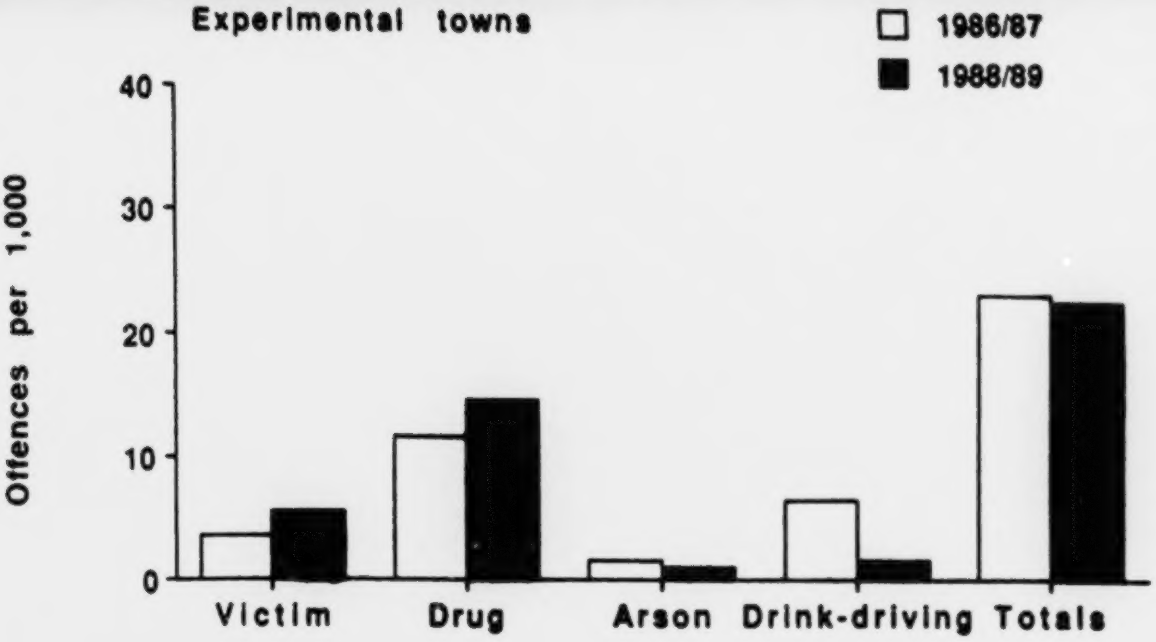
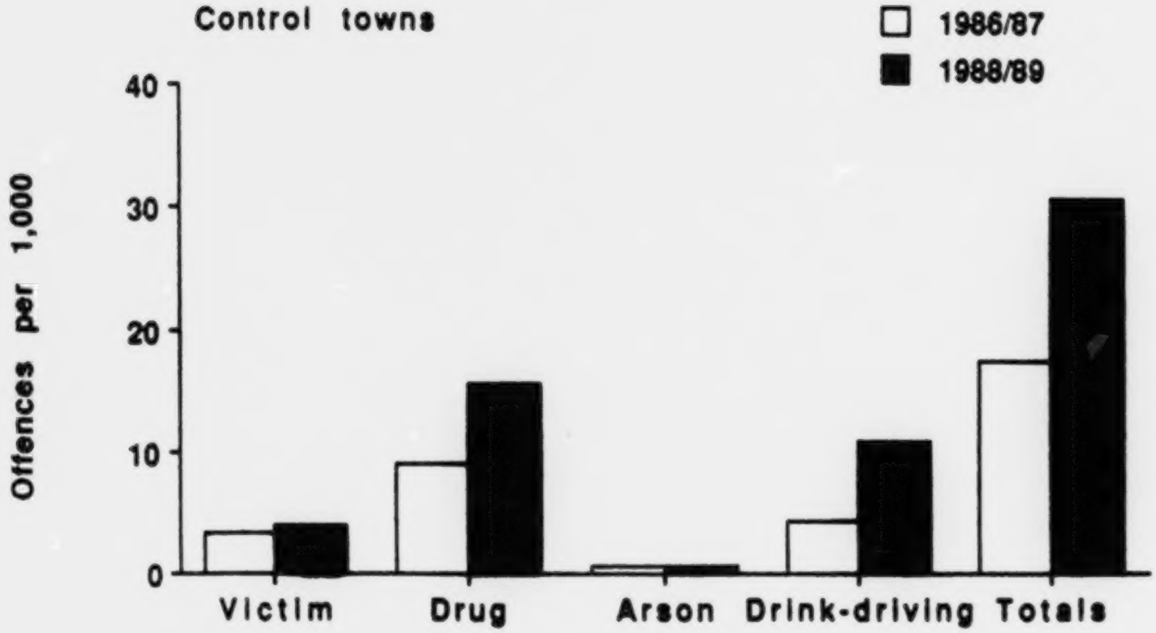
Because the chi square statistic is not applicable to scaled or normalised data as the test is invariant under scaled data the observed frequencies have to be used. The differences between populations in each town are therefore catered for by the increased expected values in the cells.

4.2 Mean serious offences per annum per 1,000 across experimental (A and B) and control towns (C, D & E, and F)


Experimental towns
☐ 1986/87
■ 1988/89
Offences per 1,000
40
30
20
10
0
Victim
Drug
Arson
Drink-driving
Totals


Control towns
☐ 1986/87
■ 1988/89
Offences per 1,000
40
30
20
10
0
Victim
Drug
Arson
Drink-driving
Totals

"other" offences there were four decreases more than 10% and no increases more than 10%. For control towns there were two decreases greater than 10% and five increases greater than 10%. This difference between increases and decreases above or below 10% in experimental and control towns (Table 4.1) was significant; $X^2(1, N = 11) = 4.45, p < .02$.

Total "other" offences (Table 4.1) in experimental Town B shows a decrease in crime following hotel closure; a 30% reduction. Town A total "other" offences decreased slightly (only 3%). In two control towns total "other" offences showed a small increase or decrease. Only in Town E did total "other" offences increased notably; a 15% increase.

Examination of each type of "other" offence (Table 4.1) shows a reduction in antisocial offences including fighting in public, drunk and disorderly behavior, and breach of the peace. These reductions were consistent with decreased alcohol availability in experimental towns. In both experimental Towns A and B antisocial offences decreased 65% and 44% respectively. Antisocial offences did not change systematically in control towns (Table 4.1), with no change in Town C, a 50% decrease in Town F, and a 30% increase in Towns D & E.

In one experimental town (Table 4.1) traffic offences decreased more than 10% (Town B by 27%), and remained unchanged in Town A. In control towns traffic offences increased more than 10% (Towns C, D & E, and F, respectively 50%, 60% and 46%).

Serious Offences

Figure 4.2 shows total serious offences in experimental and control towns. In experimental towns total serious offences declined slightly from 23 per 1,000 before hotel closures to 22 after hotel closures. In control towns (Figure 4.2) total serious offences increased from 17 per 1,000 to 30 after hotel closures. This difference was significant; $X^2(1, N = 1715) = 33.50, p < .001$.

Figure 4.2 shows that in experimental towns total serious offences decreased after hotel closures due to a reduction in drink driving offences. In control towns serious offences increased due to increased victim, drug, and drink driving offences. In experimental towns the

Table 4 2 Type of serious offences per annum per 1,000 in experimental (A and B) and control towns (C, D & E and F)

Towns	A			B			C			D & E			F		
	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change
Victim	5	8	+38%	3	2	-33%	5	7	+36%	2	2		2	2	
Drugs	14	21	+33%	10	8	-20%	16	32	+50%	3	6	+50%	8	8	
Arson	2	1	-50%	1	1		0	0		1	1		1	1	
Drink_drive	3	1	-66%	10	2	-80%	9	15	+40%	2	5	+60%	2	12	+83%

changes in drink-driving were significantly different compared with control towns; $X^2(1, N = 20523) = 106.25, p < .001$. Overall, serious victim offences increased in both experimental and control towns. Drug offences increased more in control towns than in experimental towns but the difference was not significant.

Numbers of serious offences for individual experimental and control towns (C to F) are presented in Table 4.2. Again using the criteria measure of 10%, Table 4.2 shows that in experimental towns there were four decreases greater than 10% and two increases greater than 10%. In control towns there were no decreases greater than 10% and five increases greater than 10%. This differential change between experimental and control towns was significant; $X^2(1, N = 11) = 5.30, p < .02$. Town B again showed a decrease in total serious offences (41%), which was consistent with the data from "other" offences. There was a 29% increase in Town A. However, total serious offences increased more than 40% in all control towns (Table 4.2).

Examination of the types of serious offences (Table 4.2) shows a large reduction in drink-driving offences in Town A and B. This was consistent with decreased alcohol availability. By comparison, in control Towns C, D & E, and F drink-driving offences increased by 44%, 60% and 83% respectively. Drug offences (Table 4.2) increased in experimental Town A and decreased in Town B. But in control Towns C and D & E drug offences increased by 50%, and remained unchanged in Town F.

In summary, results from the experimental towns appear consistent with a reduction in alcohol availability. Patterns of change in the number "other" and serious offences showed significant reductions in experimental towns. In particular, the reductions in experimental towns of traffic, antisocial disorder offences, and drink-driving offences are consistent with reduced alcohol availability.

DISCUSSION

The present research involved a naturalistic experimental study of offences following reduced alcohol availability in a provincial area of New Zealand. Criminal offences were examined across two levels; that is, all offence types were separately classified as "serious offences" and "other" offences. Both total serious offences and total "other" offences declined in experimental towns following a reduction in alcohol availability, compared to increases in control town offences. In addition, these results were consistent with expectations concerning decreased alcohol availability and the types of offences showing marked reductions.

Antisocial offences such as fighting in public, drunken and disorderly behavior, and breaches of the peace decreased in both experimental towns (A and B). Traffic offences including speeding and reckless driving declined in experimental towns but increased substantially in two control towns. In control towns total traffic offences, speeding and reckless driving showed a small increase. More significantly, however, drink driving declined in both experimental towns. In control towns drink-driving offences more than doubled (from 13 to 32 per 1,000) in control town police areas during the same period.

Table 4.2 shows that the largest increase in drink-driving offences occured in Town F. Relocated drinking or drink-driving by experimental town residents did not appear responsible for increase drink-driving offences in Town F. Town F drink-driving increased more (10 per 1,000) than the combined increase in Towns C, D & E (9 per 1,000). Town F is the most distant town from experimental towns in this study: 40 kilometres from Town A and 25 miles from Town B. A possible explanation for increased drink-driving in Town F was that two new chartered clubs (high risk venues of alcohol consumption) opened in 1988/89. Town F liquor sales had increased 65%. This large increase in liquor sales could reasonably transfer into increased drink-driving from a high risk venue for alcohol consumption.

A Report in the 1988 Police Digest of Statistics showed "National" offence rates per 1,000 (including serious offences) from 1985 to 1988 were respectively 123.9, 131.6, 132.1, and 130.2 (New Zealand Police, 1989, p. 69). Control town offences (including serious offences) per 1,000 between 1985 and 1988 were respectively 120.80, 123.43, 137.46, and 139.20. The control town crime levels were therefore consistent with the national levels.

It was of interest to compare domestic assaults between experimental and control towns, in view of national police reports that in 90% of domestic disputes one or both parties had consumed alcohol. Although serious assaults increased in Town A, assaults in a domestic setting did not change in both experimental towns. A possible explanation comes from the previous result (Chapter 3) that in both experimental and control towns, drinking at home mediated low levels of consumption. Domestic violence may therefore be due to men coming home drunk from licensed venues of high alcohol consumption.

Regarding the impact of alcohol availability on crime, Room (1983) asked whether crime would change if patterns and levels of consumption changed? The previous result (Chapter 3) showed that in experimental towns patterns and levels of consumption changed following a reduction in alcohol availability. The present study showed clear evidence of a differential change in the two experimental towns total in serious offences and total "other"offences following the reduction in alcohol availability, compared to continued increase in serious and "other" total in control towns during the same period. We may therefore that the reduction in alcohol availability was associated with a decreased rate of both "serious" and "other" offences.

The reduction in total "other" offences and drink-driving offences in experimental towns of the present study is entirely consistent with the findings of other alcohol availability studies in New Zealand (Brown, 1978; Stewart & Casswell, 1986), Australian (Smith & Burvill, 1986ab) and with American studies of crime and alcohol involvement (Roizen & Schneberk, 1978). These results also concur with the only other New Zealand study that examined the affects of reduced alcohol availability on offending (Brown, 1978). Brown reported similar findings including a decline in alcohol-related offences; drink-driving offences, and antisocial behavior (drunkenness, disorderly behavior, and fighting).

In conclusion, this study supports the drink-driving research of an association between alcohol availability and crime (Room, 1983). In two experimental towns both serious and "other" offences separately showed a differential change following hotel closures. In particular, changes in drink-driving and alcohol-related antisocial offences decreased. In control towns offences continued to increase consistent with national levels.

Chapter 5

Leisure and alcohol availability

Until recently very little was known about alcohol consumption and its relation to sports, leisure activities and New Zealand lifestyles. During the 1980's large studies were conducted on lifestyles, diet, nutrition, exercise, and sporting and leisure activities in Australia (Australian Department of Arts, and Sport, 1988), Canada (Stephens, & Craig, 1990), and by the WHO (1983). A major New Zealand study by a combined association of the Cancer Society, the Heart Foundation, Department of Health, and the Medical Research Council in New Zealand was conducted from the University of Otago (Russell & Wilson, 1991; Wilson, Russell, & Paulin, 1990). The research group used interview surveys, blood samples, tissue samples, and daily diary records of 12,000 New Zealanders to examine, physical activity, leisure, health (including alcohol consumption), and nutrition. According to this study, over 53% of New Zealanders 15 years and over drink alcohol at least once a week, and 17% of men and 8% of women drink alcohol daily. The most favoured at-home leisure activities were reading, watching television or video, listening to music, gardening, playing with children, art and crafts, relaxing or doing nothing, and watching sport. The most favoured leisure activity away from home, with the exception of visiting friends and family, was socialising at pubs, clubs, and hotels. Compared to other leisure activities choosing to drink alcohol was very common and popular (Wilson et al., 1990).

The behavioral theory of choice predicts the inverse relation between drinking and choice of leisure activities. Engaging in drinking alcohol or other leisure activities can be regarded as a matter of competing choices. The behavioral theory of choice predicts that the likelihood of drinking can be decreased by increasing the value of competing choices. Drinking is therefore determined by what other alternative activities are available and what constraints are placed on access to alternative activities.

Analysis of results from the life in New Zealand survey suggested that values and response costs affect the choice of engaging in drinking versus alternative leisure activities. Survey respondents reported that the choice of activities outside the home was dependent on external factors. That is, people would make time to engage in an activity if it was low cost, handy to them, possibly involved others, and if weather permitted its choice. At first glance it would appear that hotels and clubs as contexts for drinking offer these external factors. Hotels and some clubs are open from 10.00 am to 10.00 pm, some bars open 24 hours. The weather does not present a major problem. Company, handy recreational facilities, and price are therefore factors that outside-home leisure activities must compete with.

The behavioral theory of choice asks the question about alcohol availability and the availability of leisure activities. What happens to competing leisure activities if alcohol availability is reduced? Does the choice to drink become less influential if a major external factor, handy hotel facilities, is absent? If alcohol availability decreased would experimental town residents engage in more leisure activities.

The present Chapter describes a naturalistic experiment to examine the affects of changes in alcohol availability on the choice of leisure activities. Leisure activities in the two experimental towns (A and B) and the two control towns (C and D) described in Chapter 3 were compared.

Table 5.1 Mean frequency of engaging in leisure activities and four consumption variables for experimental and control town residents.

	Experimental	Controls	t-test	p<
Sports and Outdoors				
Sports other	2.75	2.80	.25	
Sports alone	2.38	1.73	3.31	.01
Coach a sport	1.85	1.20	3.30	.01
Outdoor activities	3.28	2.50	3.97	.001
Drinking				
Go to dances	1.83	2.68	4.32	.001
Go to party	2.28	2.48	1.01	
Go out for a drink	2.65	2.75	.51	
Relaxation				
Watch live sport	2.75	2.70	.25	
Talk friends	4.43	4.80	1.88	
Listen to music	4.83	4.67	.81	
**Play records	3.30	3.58	1.42	
Read a book	2.95	2.98	.15	
Read a newspaper	4.77	4.80	.15	
Read a magazine	3.35	3.05	1.52	
Play Instrument	1.60	2.22	3.16	.01
Mind children	3.15	2.80	1.78	
Watch T.V/video	2.70	3.28	2.95	.01
A.A. last drinking occasion	40.32	95.15	3.20	.01
Frequency of getting drunk	3.32	4.25	2.05	.05
Frequency of drinking	3.25	3.50	1.00	
Weekly spend on alcohol	13.42	27.92	2.50	.05

METHOD

Structured interviews were conducted in two experimental towns (A and B) and two control towns (C and D), within the same geographic region of New Zealand. The selection of subjects and interview procedures are detailed in Chapter 3. Leisure activities were classified into three activities: sports and outdoor activities, relaxation, and drinking activities. Sporting activities included playing sport alone, playing sport with others, coaching a sport, and outdoor activities included hunting, boating, or fishing. Relaxation activities included watching live sport (not on television), talking with friends, listening to the radio, playing records, tapes, or compact disks, reading books, magazines or newspaper, learning or practicing a musical instrument, minding children, and watching television or video. "Go out for a drink" was included as one of the 15 leisure activities, and was assessed separately from the different measures of alcohol consumption for each person interviewed.

Residents of all four towns were asked to reply to questions about drinking and leisure activities. Responses to questions about leisure were scored using a likert type scale of the frequency of leisure activities: 5 almost every day, 4 at least twice a week, 3 less than once a week, 2 not often, and 1 never. For comparison four alcohol measures (previously examined in Chapter 3) were included in the analysis with leisure activities. These included the frequency of drunkenness, frequency of drinking alcohol, the amount consumed on the last drinking occasion in the last month, and weekly spending on alcohol. For each person interviewed, the amount consumed on the last drinking occasion in the last month was translated into milligrams of absolute alcohol equivalent (detailed in Chapter 3). The mean ages of the residents in experimental and control towns was 39 and 35 respectively.

RESULTS

Table 5.1 shows the mean ratings for the different leisure activities. Experimental town residents engaged in significantly more sports alone, coaching sport and more outdoor activities. There was no difference between experimental and control town residents in the frequency of engaging in team activities or sports with others. The same mean squared error term was used for all comparisons.

Table 5.1 shows that the frequency of going to dances was significantly greater for control town residents. The non-significant difference between experimental and control town residents in going out for a drink or to parties is consistent with other data from the structured interview. That is, the number of drinking occasions did not differ (Table 5.2). Table 5.1 shows that control town residents reported getting drunk, spending more per week on alcohol, and drinking more on the last drinking occasion than experimental town residents. This result provides further evidence that it is not the frequency of drinking occasions, going to parties, nor going out for a drink that is important, but the amount consumed is most important when measuring drinking behavior (Chapter 3).

Table 5.1 shows there were few significant differences between the frequency with which experimental and control towns residents engaged in relaxation activities. Differences were observed, however, when control towns residents talked to friends, played a musical instrument, and watched television or video. Experimental and control town residents engaged in the other seven relaxation activities with similar frequency.

The different leisure variables were grouped together into three categorise, Sports and Outdoors, Drinking, and Relaxation (see Table 5.1). Ratings on the individual items were combined to give an overall rating for each category. Overall, ratings for experimental and

Table 5 2 Correlations between five leisure activities and four consumption variables for experimental and control town residents combined (N = 80)

	A A last drinking occasion	Frequency getting drunk	Frequency of drinking	Weekly spending on alcohol
Sport others	•	27*	.26*	.22*
Outdoors	22*	40***	.43***	.28**
Dancing	51***	•	•	.24*
Parties	43***	.52***	.40***	•
Go out for a drink	.51***	56***	28*	.64***

control towns residents did not differ for relaxation activities (3.30 and 3.32 respectively). Sports and outdoor activities were engaged in more frequently by experimental town (mean 2.52 versus 2.05, t(78) = 3.50, p< .01). Drinking activities were engaged in more frequently by control town residents (mean 2.25.versus 2.65, t(78) = 2.15 p< .05)

Correlational analysis

The significant Pearson product moment correlations (N=80) between five of the 15 leisure activities and four consumption variables are presented in Table 5.2. In Table 5.2 the five leisure activities were highly correlated with the four consumption variables. Playing sport with others was correlated with three of the four consumption variables. This result may reflect the influence of, for example, rugby football, lawn bowls, or golf as the main type of sporting activities in all towns. Engaging in outdoor activities was also highly correlated with the four consumption variables.

Table 5.2 shows that the three drinking related leisure activities were highly correlated with the four consumption variables. That is, going to parties, pub dances, or discos, and going out for a drink all appear to involve varying amounts of drinking behavior. Going to dances, discos, and pub dances did not, however, correlate with the frequency of drinking or getting drunk. Perhaps dancing, which directly competes with drinking behavior, may reduce the amount consumed and therefore the frequency of getting drunk. Going to parties was highly correlated with the consumption variables, with the exception of weekly spending on alcohol. Going out for a drink was highly correlated with the four consumption variables. There were no significant correlations between the four consumption variables and the 10 leisure activities.

In summary, a between-group comparison of experimental-and-control-town residents leisure activities following reduced alcohol availability showed that experimental-town residents engaged significantly more in sporting and outdoor activities. Control town residents engaged in significantly more drinking-related activities. Play sports with others and drinking leisure activities were highly correlated with the four consumption variables. Drinking-related activities in high-risk licensed context for drinking (pub dances, and discos) were correlated with the four consumption variables. The ten relaxation variables, from mainly low-risk contexts for drinking, were not correlated with the four consumption variables. These data have significance regarding the interpretation of competing choice activities from the perspective of the behavioral theory of choice and for the affects of alcohol availability on leisure and drinking-related activities.

DISCUSSION

The present research involved a novel naturalistic experimental study of leisure activities and drinking-related activities by experimental and control town residents. According to the behavioral theory of choice, if constraints on access to alcohol are increased, (e.g., an 8 to 30 kilometre drive to get alcohol), then engaging in alternative activities to drinking was more likely. Results showed experimental town residents engaged in significantly more sporting and outdoor activities and fewer drinking-related activities than control town residents. There was little difference between experimental and control towns residents frequency of engaging in relaxation activities. These results are entirely consistent with reduced alcohol availability and predictions from the behavioral theory of choice. If experimental town residents spend less per week, drink less, and get drunk less, (as discussed in Chapter 3) it is consistent that they had more time and money to engage in alternative activities.

Correlation between drinking variables and leisure activities were also consistent with the behavioral theory of choice and the influence of the contexts for drinking. All the drinking-related leisure activities were highly correlated with the four consumption variables. Experimental and control town residents engaged in seven of the ten relaxation activities with similar frequency. In addition, none of the relaxation variables were correlated with the four consumption variables.

The significant and non-significant correlations between types of relaxation leisure activities and drinking-related activities may be reflecting the influence of contexts for drinking. All the drinking-related activities and playing sport with others (rugby football, lawn bowls, or golf) are within or near high-risk contexts for drinking. Whereas, relaxation activities are in or near low-risk contexts for drinking i.e, at home.

Several findings are of interest from the behavioral theory of choice perspective. Going to dances was not correlated with either drinking, or the frequency of getting drunk. This result may reflect the direct competition of dancing with drinking activities and the amount of alcohol consumed. The non-significant correlation of ten relaxation variables is also consistent with this analysis from the behavioral theory of choice. Relaxation activities that compete with drinking behavior in low-risk contexts for drinking (at home) should not correlate with drunkenness or weekly spending on alcohol.

It is encouraging, however, that spending per week on alcohol correlated very highly with drinking-related leisure activities. Moreover, that spending on alcohol per week was not correlated with any of the relaxation - home based, leisure activities. Recent researchers have suggested that money (dollars spent on alcohol) as a unit measure may be a very good dependent variable to measure short-term alcohol treatment outcome (Tucker et al., 1991). In a preliminary study of predicting relapse, income and expenditure documents were used to determine the allocation of reinforcement values, dollars spent, on various commodities including spending on alcohol. That is, money spent was an "important predictor of posttreatment drinking by 26 alcoholics" (Tucker et al., 1991, p. 1043). As the dependent variable (dollars spent) showed a shift in resources to drinking or alternative activities (Tucker et al., 1991). Indeed with future studies dollars spent could independently measure the clinical severity of a lapse or full alcohol relapse. Data from the present study suggest that money spent on alcohol is highly correlated with alcohol consumption and alcohol related leisure activities.

However, the present study is a first attempt to link the choice of leisure activities with consumption variables and several findings from the present study appear less consistent with previous findings. In particular, the frequency of going out for a drink or to a party (treated as leisure activities) by experimental and control town residents were not significantly different. Previous results from the structured interview (Chapter 3), however, noted that the frequency of drinking occasions by both experimental and control town residents was very similar. Therefore the non-significant difference in going out for a drink and to parties is consistent with Table 3.4 in Chapter 3.

Another problem with the methodology was the lack of definition of some leisure variables. Outdoor activities may have overlapped with many other types of activities. For example, exercise related activities including jogging, or playing sports should be separately defined from outdoor activities of gardening, painting, or watching sport. Redefining the type of exercise or leisure activity may then lead to questions about the duration of time allocated to a behavior. Therefore placing some value on an activity (the amount of time or money allocated to drinking and non-drinking behaviors) could help measure what activities are maintaining desired behavior changes (Tucker et al., 1991). Recent large leisure studies in Canada (Stephens & Craig, 1990) and New Zealand may help define leisure activities in the home and away from home. In addition, these leisure studies may then help classify exercise and recreational activities (Hopkins, Wilson, & Russell, 1991; Russell & Wilson, 1991).

Few studies have, however, investigated the association between choice, alcohol availability, and leisure activities. The Hillary Commission has just completed a major study of lifestyles and leisure activities in New Zealand (Russell, & Wilson, 1991). Their profiles of health, diet, and physical activities was the first New Zealand study to support the association between visiting sports clubs and hotels and drinking alcohol as a leisure activity (Russell, & Wilson, 1991). While the association between increased drinking in hotels has been well established in America (Clark, 1985; 1988), and New Zealand (Bradbury & Clark-Reynolds, 1985; Martin, 1984; see Chapter 3 of this study), the link between sports clubs as high-risk venues of alcohol consumption with sports and leisure activities has not been as well established. Previous results (Chapter 3) showed that some sports clubs maybe high-risk venues of consumption. Spending per club member as a dependent variable showed that squash, social, and combined sports clubs had lower mean spending than rugby football, bowls, and chartered clubs.

From the perspective of the behavioral theory of choice, what competing activities are available "within" sports clubs, or hotels for that matter, needs further examination.

An important factor that may impact on interviews regarding drinking or competing leisure activities, and clubs as contexts for drinking, might be a seasonal factor. This structured interview of leisure activities was conducted during the middle of winter when sports such as hockey, rugby football, and soccer are played. The sports clubs that support these types of activities are probably open more during the winter season. It is would therefore be prudent to take measures of leisure activities across all seasons. As it is not unreasonable to suggest that club members may increase their spending during the summer for lawn bowls clubs, and during the winter months for rugby football and other winter sports. An interesting exception, is indoor sports such as squash, basketball, and indoor social clubs such as bridge and chess clubs. These clubs have consistently shown low mean spending per member. For reasons discussed in Chapter 3, the different levels of spending in clubs is of interest because low spending per member occurs in clubs that offer activities that directly compete with drinking behavior.

Implications from this study suggest that the control of alcohol consumption should be tackled at both a "community and individual" level. If the main aim of a community primary prevention programme is to reduce alcohol availability (Moskowitz, 1989), then constraints on access to alcohol should be increased. Similarly, at an individual level problem drinkers should be actively encouraged to engage in alternative activities to drinking. These implications at both the community and individual level will be discussed further in Chapter 6.

In summary, this novel study showed when constraints on access to alcohol increased (during hotel closures) experimental town residents engaged in more leisure activities and fewer drinking-related activities than control town residents. This result was consistent with predictions of the behavioral theory of choice. Relaxation leisure activities that appeared to directly compete with drinking activities within or near low-risk context for drinking were not correlated with consumption variables, nor weekly spending on alcohol. The allocation of spending money on leisure or drinking activities may continue to be a very promising area of research. Some items such as details of leisure or recreational activities, consumption variables and the contexts for drinking are in need of clearer definition. This study was a first attempt to examine, at a community and individual level, the inverse relation between access to alcohol consumption and leisure activities.

Chapter 6

GENERAL DISCUSSION

A Naturalistic Study

The reduction in alcohol availability following hotel closures presented a unique chance to study alcohol consumption in a provincial area of New Zealand. After two pilot studies gathering preliminary data and interviewing health, police, social welfare, school councillors, and community workers (funded by the Alcoholic Liquor Advisory Council), I was convinced that this was a rare opportunity for a naturalistic study. The significant elements of this study were already unfolding. According to informal reports by local people, alcohol consumption and crime had dramatically decreased in experimental towns.

I had just completed a comprehensive review of New Zealand's alcohol literature from the perspective of the behavioral theory of choice for the Alcoholic Liquor Advisory Council (Kraushaar & White, 1988). It was compelling to apply this framework to changes in a natural environment. Here I will consider the results of the three studies (Chapter 3, 4, 5) in relation to the literature on alcohol availability and the behavioral theory of choice. Further, I discuss the wider implications of these studies for control of alcohol consumption by individuals and communities. Finally, I will consider future research from the perspective of the behavioral theory of choice.

The Behavioral Theory of Choice

To briefly recap, the behavioral theory of choice makes several predictions about human choice behavior. When applied to alcohol consumption, it asks in what situations does drinking become a preferred behavior? According to this framework, drinking is seen as one of a number of choices from an available set of behaviors, for example playing sport, watching television, or drinking at a hotel. Hence drinking as a preferred activity, rather than engaging in alternative activities, suggests that the consequences of drinking can maintain this choice behavior.

The behavioral theory of choice makes predictions regarding variables that control consumption and alcohol abuse by individuals. Two classes of variables are central to this analysis. The first variable asks what are the direct constraints on access to alcohol? The second variables ask what alternative reinforcers are available, and what are the constraint on access to these alternative reinforcers? In sum, the behavioral theory of choice predicts an inverse relation between drinking alcohol and the reinforcers for non-drinking behavior. As constraints on access to alcohol increase (e.g., hotels close), consumption will decrease. The second variable predicts that if alternative reinforcers (e.g., leisure activities) increase, the choice of leisure activities is more likely.

The behavioral theory of choice (Vuchinich & Tucker, 1988) and its related research (Vuchinich & Tucker, 1983; Vuchinich, Tucker, & Rudd, 1987: Landau, 1986) has previously accounted for the allocation of individual drinking behavior. This individual level of analysis refers to small units of study, for example individual choice behavior in a two choice setting - a choice between money or alcohol reward. If the predictions of this framework are to be applied outside the laboratory, then the development of this theory for a molar (community) level of analysis is essential. Present technology cannot measure each individual's choice behavior in the natural environment at the detailed level achieved in the laboratory. Several other authors have also arrived at this conclusion regarding patterns of alcohol use (or any addictive substance for that matter) and the availability of alternative reinforcers. The behavioral theory of choice "argues that important regularities between substance use patterns and the environment will likely emerge at a more molar level of analysis that considers how temporal patterning of substance use changes as a function of changes in access to alternative reinforcers" (Tucker, Vuchinich, & Gladsjo, 1991: p. 1037). However, the allocation of behavior in the natural environment from the individual level to the community level should be theoretically consistent.

Analysis of Community Variables

First we consider the evidence from the present research at a community level for the effects of direct constraints on access to alcohol. There are three lines of evidence that indicate increased constraints affect drinking behavior.

(1) Predictions that consumption would decrease if constraints on access to alcohol increased were supported. In experimental towns (A & B), liquor sales figures showed an expected decrease following hotel closures. In control towns (C, D & E, and F), where constraints on access to alcohol remained unchanged, liquor sales increased slightly. In distant Towns G and H the rate of change in liquor sales was very similar to control towns.

(2) Drink-driving figures decreased in experimental towns, which supports a decrease in consumption by experimental town residents. Drink-driving offences continued to increase in all control towns.

(3) The third line of evidence comes from one of the control Towns F. In Town F alcohol availability increased when two new high-risk venues of consumption (clubs) opened. According to predictions from the behavioral theory of choice, new high-risk venues of alcohol consumption should decrease constraints on access to alcohol, the choice to drink should be more likely, alcohol consumption should increase, and alcohol-related drink-driving should increase. As predicted, for Town F consumption greatly increased, liquor sales increased by $1 million (55%) during 1988/89. Moreover, drink-driving increased in control Town F by more than the combined increases in Towns C, and D & E where constraints on access to alcohol remained unchanged.

These three lines of evidence converge to support the behavioral theory of choice; that is, if constraints on alcohol change there will be the opposite change in consumption.

Analysis of Individual variables

Further analysis of the results centres on the drinking behavior of individuals. These data were obtained from interviews. These results were consistent with the community data. Interview responses show that spending per week on alcohol by experimental town residents was significantly lower than spending on alcohol by control town residents. This finding was consistent with the reduction in liquor sales. In addition, experimental town residents reported less frequent drunkenness than control town residents. This was consistent with drink-driving data.

A second individual variable concentrates on the inverse relation between drinking behavior and other activities. Interview questions asked what leisure activities did experimental or control towns residents engage in during the period that the hotels were closed. The behavioral theory of choice predicts that if constraints on access to alcohol increase then the choice of drinking-related activities is less likely, and the choice of other (leisure) activities is more likely in experimental towns. Findings from the present study were consistent with these predictions. Experimental towns residents engaged in significantly more non-drinking activities including playing sports, coaching sports, and outdoor activities, than control town residents. Similarly, control town residents engaged in significantly more drinking activities which included going out to parties, or to dances and discos.

The reduction in alcohol availability or increasing constraints on access to alcohol is rarely observed in the natural environment. The results of this study and practical predictions using this framework suggest that the second class of variable may present novel ways of reducing drinking behavior. That is, increasing access to alternative activities to drinking, such as leisure activities, should make the choice of non-drinking activities more likely. Indeed, a survey of 12,000 New Zealanders also concluded that alternatives to drinking outside the home must be readily accessible, low cost, and involve others, before people make time to engage in them (Russell et al., 1991).

When designing this structured interview, I attempted to trace both leisure and contexts of drinking as indicators of allocated reinforcing behavior during hotel closures. The context for drinking was seen as an important dependent variable from the perspective of the behavioral theory of choice because this study showed changes in patterns of consumption occured at both an individual and community level. Furthermore, because the context for drinking emphasises the two classes of variables from this framework, it has assisted the explanation of results from this study.

The different patterns and levels of consumption by experimental and control town residents appear mediated by the context for drinking. Interview responses indicated changed patterns and level of consumption were not solely associated with the frequency of drinking occasions, but were associated with the amount consumed on each drinking occasion. Experimental town residents rarely consumed more than 80 mgs of absolute alcohol on any drinking occasion. In contrast, control town residents consumed more than 80 mgs of absolute alcohol (the legal drink-driving limit) on as many occasions as they consumed less than 80 mgs of absolute alcohol. These different levels of consumption appear due to experimental town residents changing from drinking in hotels and clubs to drinking at home and other contexts. Increased drinking occasions at home and in other context (restaurants, the work-place) mediated lower levels of consumption by experimental town residents. In addition, drink occasions at home and other contexts by control towns, also mediated lower levels of consumption. Control town residents drinking occasions in hotels and clubs, however, mediated higher levels of consumption. These results are consistent with research from New Zealand (Martin, 1984), and America (Clark, 1981b), that showed more drinking occasions occur at home than in hotels and clubs. But hotels and taverns are high-risk venues of consumption. Two national American surveys also showed both heavy and light drinkers consume more when in taverns and bars than in all other contexts for drinking (Clark, 1988).

Why do some contexts for drinking (home, restaurants) mediate lower levels of consumption in both experimental and control towns, and why do hotels and some clubs mediate higher levels of consumption? The primary reason for the existence of hotel bars is to sell liquor. Hotel/tavern bars have few if any constraints on access to alcohol other that legal constraints on alcohol availability - hours of sale, minimum purchase age, and commercial constraints such as the price of drinks. Hotels therefore make drinking a high probability behavior because there are few competing activities with drinking within hotel bars. Bars usually provide patrons with activities that are compatible with drinking. For example, the addition of wide television (or video) screens for watching sporting fixtures in hotel bars may encourage patrons to watch or stay to the end of a televised game (Cutler & Storm, 1975). It is not unreasonable to suggest that the reinforcing value of drinking is highest "within" those contexts that have few alternative competing activities to drinking. This would explain why some contexts are high-risk venues for consumption and others mediate lower levels of consumption.

In the present study, liquor sales by clubs also provide some support for this idea concerning competing activities within various contexts for drinking. In three types of club, namely rugby football, golf, and chartered clubs (e. g., Returned Servicemen's Association - war veteran clubs, and rural country clubs), mean spending per member was consistently higher than all other clubs in both experimental and control towns. A possible explanation for this difference in mean spending per member is that chartered, rugby football, and golf clubs often function as substitute hotels. Chartered clubs often replace hotels in country towns, and after the game members of rugby football or golf clubs remain at the 19 hole, as golfers call the bar. Clubs that obviously draw patrons away from the bar or introduce competing activities with drinking behavior had lower mean spending per member. These types of clubs with lower mean spending per member included sports clubs with multiple sports facilities, such as squash or tennis courts. Similarly, mean spending per member was very low in licensed social clubs such as chess or bridge clubs when other activities are in constant competition with drinking behavior. It should be noted these conclusions must be treated with caution. The membership of clubs is self-selecting and this by itself will have a major influence on mean spending per member.

On the other hand, this study showed drinking at home mediated similar lower levels of consumption in both experimental and control towns. The home has many competing chores and competing activities to drinking. For example, there are commitments and interruptions by

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children and family, cleaning and food preparation activities, the lawns, painting the house, the list goes on. It is therefore consistent that drinking at home mediated low levels of consumption because of other competing activities.

In general, the effects of contexts seem best understood from the perspective of the behavioral theory of choice. Certainly, the moral religious theory, the disease theory, and the alcohol availability theory would not have emphasised the importance of other leisure activities. Instead, these theories would have again concentrated on consumption (Vuchinich, 1982), and overlooked the importance of the context for drinking. Designing the structured interview around predictions from the behavioral theory of choice helped explain events in this naturalistic study. Indeed the results concerning contexts for drinking confirm the view of several major reviewers that the context for drinking is an important area of future research (Moskowitz, 1989; Holder, 1988; Single, 1988; Smith, 1983). In addition, the development of the behavioral theory of choice from an individual to a community perspective of drinking and non-drinking behavior appears poised to take a more dominant role in alcohol research. Why drinking is a preferred activity in some contexts and not others, seems best aided by the development of future experimental designs, survey instruments, and dependent variables measuring what behaviors compete with drinking "within" a particular context for drinking. In addition, finding ways of accurately measuring money spent, or time allocated to activities, may help specify the choice of drinking and non-drinking behavior (Tucker, et al., 1991).

Crime and alcohol

The link between crime and alcohol has always been controversial. One recent review of the crime and alcohol literature suggested that the question "does alcohol cause crime" was a poor theoretical approach (Walfish & Blout, 1989). The authors suggest this question should be rephrased to address the types of crime, and types of conditions that exist before and during the commissioning of a crime (Walfish & Blout, 1989). The data from the present study (Chapter 4) support the view that there is a link between alcohol and crime.

It is however, more difficult to integrate the behavioral theory of choice with alcohol and crime. The behavioral theory of choice does not seem to make any predictions about the relation between consumption and crime. However, if we accept that alcohol consumption does affect crime then it offers a means of controlling alcohol, and by extension, the relation between alcohol and crime. Until the behavioral theory of choice develops its own language and basic units of measure for describing community drinking and non-drinking behavior (Tucker, et al., 1991) the task of describing community events can, in my view, be assisted by the alcohol availability theory. I make one assumption between the behavioral theory of choice and the alcohol availability theory; that is, a decrease in alcohol availability in experimental towns increases constraints on access to alcohol. If one accepts this assumption, then the relation between crime and alcohol would predict that any sizable effect on consumption (i.e., by increasing constraints on access to alcohol) also would impact on crime.

In this study, "other" offences were significantly lower in experimental towns and continued to increase in control towns. Similarly, changes in serious offences showed the same trends with fewer offences in experimental towns following hotel closures. In control towns serious offences continued to increase during the same period. Total serious offences in control towns increased between 41% and 44%. In experimental towns total serious offences decreased, or the rate of increase was well below the rate of serious crime in control towns. This consistency between decreased "other" and serious offences in both experimental and control towns suggests that a reduction in alcohol consumption affected the level of both types of crime. Furthermore, the particular changes in experimental town crime were consistent with the decreased alcohol consumption, that is, drink-driving and antisocial behavior associated with drinking, decreased. In control towns drinking-related offences continued to increase.

Two lines of evidence from previous studies also suggest constraints on alcohol availability affects crime. Naturalistic studies examining the interruptions in the supply of liquor (strike studies), of between 4 and 9 weeks, have shown large reductions of assaults, domestic violence, hospital admissions, drink-driving crashes, pub and alcohol-related offences and antisocial behavior in Poland, Finland, Norway, and New Zealand (Brown, 1978; Room, 1983). Unfortunately, in other countries the predominant theories of alcohol abuse focused their research attention on the disease concept therefore chance interruptions in supply studies were often missed (Room, 1983).

A second line of study concerns the effects of lowering and raising the minimum purchase age. In Australia, which has a similar cultural background to New Zealand, several studies have shown that lowering the minimum purchase age increased consumption, juvenile crime, and both fatal and injury auto crashes in 3 Australian States (Smith & Burvill, 1986ab). Large multi-state studies in the United States have also reported a consistent link between increased alcohol availability, increased consumption, and rates of drink-driving crashes and injuries (Du Mouchel et al., 1987; Hingson et al., 1983; Hoskin et al., 1986; O'Malley & Wagenaar, 1991). The results of the present study (Chapters 3, 4) concerning the relation between consumption and drink-driving support the results from these earlier drink-driving/alcohol availability studies. These results are also consistent with the assumption that raising the minimum purchase age (decreasing alcohol availability) increases constraints on access to alcohol, and decreases consumption and alcohol-related costs.

An important question this study also raises, however, is the role of the context for drinking on drink-driving and other types of crime. Examination of the relation between crime and alcohol began when the temperance movement was reacting against contexts for drinking. The saloon, as a context for drinking, was seen as a centre of "urban crime, corruption, and manipulation of the electoral system" (Gusfield, 1983). Recent New Zealand studies of crime and alcohol have shown that hotel violence is related to the context for drinking, that is, in certain hotels there is more violence. An early study from the South Pacific Research Institute found a relationship between alcohol consumption and violence in types of New Zealand hotels (Semu, 1976). A later study concluded that an association existed between the seriousness of a violent

6.1 Common elements between the behavioral theory of choice, alcohol availability theory, and the moral/religious prohibition theory

Behavioral Theory of Choice

Variable A	Variable B
Constraints on Alcohol	Non-drinking Behavior
Alcohol Availability Theory	Availability of other Reinforcers
- Minimum Purchase age	
- Number of outlets	
- Density of outlets	
- Price of liquor	
- Hours of Sale	
Moral/religious Prohibition Theory	
- Prohibition	

offence and the social context (Graves, Graves, Sam, & Semu, 1979). Ethnic origin of drinkers in hotel contexts was not related to violent offences but, size of drinking group, and time spent drinking in hotels predicted the seriousness of offences (Graves, Graves, Semu, & Sam, 1981). One possible explanation for violence in hotels is that group size and the buying of rounds of drinks as a group factor "within" licensed contexts for drinking may increase consumption and therefore the propensity for violence. Violence may be a typical response within some high-risk contexts for drinking (Bradbury, 1984).

These studies and the present research suggest two possible explanations why some contexts for drinking and types of crime are highly correlated. One possible explanation is that the withdrawal of hotels reduced a possible effect of this setting on crime, in and of itself, and in respect of reducing alcohol consumption in experimental towns. The second possible explanation is that other contexts for drinking mediated lower levels of consumption and therefore lower crime.

Other Theories and Models

In reviewing the basic assumptions of each theory of alcohol abuse the three theories the moral/religious prohibitionist theory, the alcohol availability theory and behavioral theory of choice have several common elements: the control of contexts for drinking, and legal prohibitions. The question therefore is, how does the treatment of the results in the present study compare with other theoretical approaches to the problems of alcohol use and abuse?

There is much common ground between the behavioral theory of choice, alcohol availability theory, and the moral/religious prohibition theory. This relation is demonstrated in Figure 6.1. As shown by Figure 6.1, the alcohol availability theory can be viewed as a subset of the behavioral theory of choice and the moral/religious prohibitionist theory as a subset of both. It is not surprising that alcohol availability theorists by proposing limiting hours, prices, and limiting the number of contexts, have been labelled Neo-prohibitionists (Room, 1984). Similarly, many aspects of the present study would not surprise alcohol availability theorists, nor

6.2 The relation between drinking and non-drinking behavior from the perspective of the behavioral theory of choice

$$\frac{\text{Drinking behavior} \Downarrow}{\text{Non-drinking Behavior}} \approx \frac{\text{Alcohol availability}}{\text{Other available reinforcers} \Uparrow}$$

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moral/religious prohibitionists. In all cases, both theories would suggest that increased limits on consumption (i.e, closing hotels) should decrease the level of consumption.

One obvious casualty, however, is the disease theory. It cannot deal with data at a community level. The disease theory has little to say about contexts other than articulating to individuals that alcohol is a hazardous substance, but the disease theory does not actively prevent social or personal costs of alcohol abuse among the non-alcoholic population. So, on one hand, the moral/religious prohibition theory, alcohol availability theory and the behavioral theory of choice appear only to differ in a matter of degree. However, this is an important difference. For example, prohibition is often shown as a failure in western societies, (which may be due more to over dramatic movie and television scripts than scientific evidence). Ever since prohibition evasion of controls on alcohol has been a popular consumer sport (Room, 1984). However, an important legacy left by the prohibition experiments in western societies is that legal controls on alcohol are now accepted and practiced (Gusfield, 1983). Certainly, the success of the alcohol availability theory in raising the minimum purchase age laws is in part due to the legacy of moral/religious prohibitionist theory; that is, control of consumption can be legislated for. For example, the legal minimum purchase age, the 80 mgs drink-driving limit, hours of sale, are all prohibitions in force today. Prohibition is not an anachronistic method of controlling alcohol as many people today are spared the social and personal costs of alcohol abuse. Millions of Moslem and Hindu people in India, because of legal/moral or religious beliefs, do not suffer the social and personal costs of alcohol abuse as the law in these countries and states prohibits alcohol consumption (Single, 1988). Results of the present study of decreased drink-driving and previous alcohol availability research suggests some prohibitionist controlling legislation is needed to protect young people from early alcohol abuse and crime careers (Temple & LaDouceur, 1986), and traffic crashes (Hingson et al., 83; Hoskin et al., 1986; O'Malley & Wagenaar, 1991).

A different, but complementary approach, such as that suggested by the behavioral theory of choice is therefore required because other theories have not prevented alcohol abuse

(Moskowitz, 1989). The acid test of any theory of alcohol abuse today is that a theory should generate worthwhile primary prevention strategies (Ashley & Rankin, 1988; Moskowitz, 1989; Room, 1984). The behavioral theory of choice, I submit, offers a broader theory to implement primary prevention strategies because it can make predictions at an individual and community level.

To effect change within contexts and institute primary prevention strategies for alcohol abuse a two pronged approach is required (Figure 6.2). Previous research has concentrated on alcohol consumption alone, the top panel of the equation in Figure 6.2. That is, the manipulation of alcohol availability and drinking behavior, or variable A from the behavioral theory of choice. According to the behavioral theory of choice both sides of the inverse relation between drinking and non-drinking behavior need to be tackled at the same time. As shown in Figure 6.2, it is equally important that the lower panel of the equation, or variable B, is considered. The lower panel concerns changing the availability or constraints on alternative activities to drinking. If wide ranging primary prevention strategies are to be enacted both variables A and B should be addressed. To affect any change in crime or alcohol abuse the results of the present study and prediction from the behavioral theory of choice predicts that consumption should be reduced and the choice of alternative activities to drinking must be increased. That is, sport, outdoor, and family leisure facilities should be more readily availability at low prices if the choice of drinking behavior is to decrease (Figure 6.2), and the choice of other activities is to increase.

In the present study, the opposite two variables in this inverse relation changed. Alcohol availability decreased in experimental towns with a corresponding decrease in drinking-related behavior including drink-driving, as well as "other" and serious crime. In addition, to this predicted decrease in drinking behavior, residents reported engaging in more leisure activities when compared with control town residents during the period hotels were closed.

Implications for community control of alcohol

The implications of the present research centres on the analysis using the two variables of the behavioral theory of choice at an individual and community level. First, I believe that a central component of any approach to the problem of alcohol abuse is that each community should have control of alcohol consumption. In the present study the effects of reduced alcohol availability were felt at a community level. Experimental town crime, drink-driving, liquor sales, and levels of consumption decreased. This shows how much a community suffers the social costs (crime, drink-drivers) of alcohol consumption and alcohol abuse. Therefore I believe each community should control the granting of licenses, constraints on access to alcohol by younger persons, setting hours of licensed sales of liquor, and the number of outlets with its precincts. This might seem impossible. However, if a new vanguard of community control (neo-prohibitionism) is to arise, the suggestion that communities control access to alcohol is not misplaced.

Remarkably, the same legal provisions that enabled prohibitionists to gain community control of licensing in New Zealand are still embodied in law. New Zealand's Sale of Liquor Act 1989, clause 180 part 2, allows control of licenses by local community authorities (See Appendix A). According to clause 180 part 2 and the regulations attached to the Act, a survey (usually a petition) signed by 15% of registered voters within defined boundaries can petition the Minister of Justice for a local plebiscite asking for the formation of a Licensing Trust. If 50% of voters agree to a trust being formed, then when annual liquor licenses are due for renewal they would pass to the new Licensing Trust. This would effectively give the local community absolute control of the social effects of alcohol consumption and constraints on access to alcohol. A primary prevention strategy for community control based on Figure 6.2 is very possible. This strategy would gain community control of liquor licenses and a large share of the profits. This could be used to increase the range of alternative activities to drinking.

A working example is the Invercargill Licensing Trust. This city of about 40,000 has community facilities that cities twice its size lack because liquor sales profits are put back into the community.

These include, a free all weather valadrome (cycling facility), free all weather hockey and rugby football pitch, a heated enclosed Olympic size swimming pool, a major sporting and gymnastics facility, and the support of many local charity and community programmes. All are funded by the trust. This is Neo-prohibitionism in action.

The relative social costs of alcohol abuse in trust and non-trust area have not been measured. However, if the results of the life in New Zealand survey (Russell & Wilson, 1991) and predictions from the behavioral theory of choice are valid, then research should find drink-driving, crime, patterns of consumption, and liquor sales, are inversely related to the availability and use of accessible new multi-choice leisure facilities. A between trust and non-trust design seems appropriate to test this prediction from the behavioral theory of choice at a community level of analysis.

Implications for individuals

The three laboratory studies (Vuchinich & Tucker, 1983; Vuchinich et al., 1987; Landau, 1986) have clinical implications. The clinically significant results are due to the prediction of Variable A of this framework, that if constraints on access to alcohol are increased alcohol consumption will decrease. In addition, clinicians are alerted to the practical application of the behavioral theory of choice regarding the availability of alternative reinforcers. Therapists should endeavour to assess not only problem drinking status, but the availability of alternative activities to their clients (Vuchinich & Tucker, 1983). Moreover, the application of this framework to relapse is readily apparent given that employment and life event have been implicated with alcohol and drug lapse and relapse (Tucker et al., 1991).

Tucker et al, (1991) critically examined the three main models of alcohol relapse including the stress-coping models, motivational-conditioning models, and the behavioral theory of choice model. All three models raise the issue of how high-risk contexts for drinking are harmful for individual relapse.

Reviewing the behavioral theory of choice applied to substance abuse (Tucker et al., 1985; Vuchinich & Tucker, 1988) this framework considered that substance abuse lapse and relapse depend on what reinforcers existed before entering the high-risk context. Internal motivational-conditioning models and motivational-state models of relapse considering the environmental conditions after substance abuse commenced. The authors report the results of a study that addressed the possible constraints on alternative reinforcers, and found reduced "life-health rewards" may increase relapse (Vuchinich & Tucker, 1991). Results showed a strong predicted relation with relapse and life-health events such as intimate and family relations, and vocational functioning. Unlike previous motivational research that has used mainly descriptive links, implications from Tucker et al., 1991 suggest that the perspective of the behavioral theory of choice can assess life-events related to drinking relapse at a molar and individual level of analysis. In addition, clinical assessment of life-health event functioning and the assessment of valuable alternative activities could indicate possible relapse. In discussing possible methodological issues Tucker et al, (1991) note that the behavioral theory of choice will move to a more molar level of analysis when it considers how patterns of consumption alter as a function of access to alternative reinforcers.

The stress-coping model centres on the high-risk environments of substance use and the properties of these contexts. Unfortunately, this concentration on high-risk context for abuse then considered internal factors (self-control, self-efficacy) that present a threat to an individual, rather than considering the physical or environmental reinforcers "within" high-risk contexts for substance abuse.

Motivational-conditioning models of relapse also consider individual encounters with high-risk contexts for substance abuse. This model then considers internal motivational-states that are conditioned and activate substance abuse. Examination of these models shows several measurement problems have yet to be addressed (Tucker et al., 1991). The need to identify what cues are correlated with substance abuse or avoiding relapse would need to be assessed using detailed histories of each problem context. A second problem is that different contexts may elicit varied affect, which also would require detailed assessment. As yet no systematic study of these problems has been undertaken (Tucker et al., 1991).

These ideas concerning relapse, context and alcohol find support in other areas of drug research. Nicotine and heroin relapse is related to contextual factors (Tucker et al., 1985). Smokers returning to high risk contexts and addicts returning to the same environment are more likely to relapse.

There is a recent parallel between Aids and transmission of HIV among intravenous drug users (IDU's) and possible strategies to reduce alcohol abuse. The awareness of the social context of drug use accounted for differing rates of HIV infection between IDU's in New York and San Fransisco (Watters, 1989). Availability of viles of bleach as needle cleaning agents, or availability of clean needle exchange programmes in San Fransisco appeared responsible for IDU's avoiding high risk shooting galleries as 'contexts for intravenous drug use'. With a better understanding of 'contexts of drug use' in the community they could target prevention programmes at high-risk contexts. Similarly, considering some contexts for drinking as high-risk contexts of alcohol relapse may go some way to instigating common alcohol prevention policies.

Tucker et al, (1985) stated "some guiding conceptual framework is essential in initially selecting sets of environmental events for study in relation to relapse and other drug use traditions" (p. 414). Application of the behavioral theory of choice to the context of reinforcement in the natural environment and their importance to crime, drug and other personal and community costs, are important areas of future research.

CONCLUSION

Alcohol use and abuse have many personal and social costs, which are important to our understanding of the hazards of alcohol consumption. Past and present theories of alcohol abuse have attempted, in different ways, and with varying degrees of success, to restrict or control alcohol consumption. According to analysis from the behavioral theory of choice, attempts to decrease consumption "only" will have limited success. While the alcohol availability theory has been of more successful than other theories by convincing legislators to raise minimum purchase age, the behavioral theory of choice has the widest application of the four theories of alcohol abuse because it can make predictions regarding alcohol use and abuse at an "individual and community" level.

The present research found that predicted increased constraints on the availability of alcohol can directly affect consumption, alcohol-related drink-driving, and antisocial behavior associated with drinking. These results are entirely consistent with predictions from the behavioral theory of choice. In addition, increased constraints on consumption appeared to impact on the community with reduced crime in experimental towns. The present study also found evidence that individual experimental town residents engaged in more non-drinking alternative activities than control town residents during the same period of hotel closures. A further factor consistent with the behavioral theory of choice is that changes in consumption appear mediated by contexts for drinking. The contexts for drinking, or the context of reinforcement, is a central component of the behavioral theory of choice. In particular, access to competing choices within some context for drinking may be responsible for mediating lower levels of consumption. Contexts that have few competing choices, within hotels and some clubs, are high-risk venues of consumption.

Finally, the behavioral theory of choice makes extremely useful predictions for implementing prevention policies at an individual level regarding alcohol relapse, and at a community level. For example, I have suggested that "The Community" should control access to alcohol. It is therefore critical from the perspective of the behavioral theory of choice that a two pronged approach be taken to reduce the determinants of personal and community costs of alcohol consumption. First, reduce alcohol consumption, but of equal importance, is to reduce constraints on access to alternative activities to drinking within communities and for individuals.

Overall, this study expands predictions from the behavioral theory of choice into the community, however, these predictions are at an "incipient stage" (Tucker et al., 1991). The implementation of primary prevention strategies from this framework to the community will be challenging Furthermore, if clinicians and policy makers use the two pronged approach suggested by this framework, they will advance the treatment and prevention of alcohol abuse. If this study helps decrease the personal and social costs of alcohol use and abuse to communities and individuals, it will not only have been a "rewarding" endeavour, but also a very worthwhile naturalistic study.

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Appendix A

Personal communication Clive Mathewson M P

Parliament House
WELLINGTON 1

Telephone (04) 471 [illegible]

21 February 1992

KEVIN KRAUSHAAR THESIS

This confirms that I discussed the Sale of Liquor Bill with Kevin Kraushaar on 8 April 1989, and that this discussion was influential in my decision on how to vote regarding the minimum purchase age.

Of particular influence were the data supplied by Kevin regarding United States and Australian studies which were able to compare accident and crime statistics from states with different age limits. This effectively decided the way I would vote. My recollection is that I mentioned this evidence during parliamentary debate on the bill.

Yours faithfully

Clive Matthewson

Clive Matthewson
MP for Dunedin West

Appendix B

The structured interview questions and consent form

Hello, I am Kevin Kraushaar from the University of Otago in Dunedin. I am a research student conducting an independent survey. The survey asks people from (here name Towns A to D) about how the Hotel closing has effected them. The information will be used for research purposes only. We are investigatin what happens when a community loses its hotel. All answers will be treated as strictly confidential. These questions will be about where people get their liquor supplies, about their drinking habits, and homebrewing. The interview will take about 15-20 minutes. I would like to seek your agreement to be interviewed. There is no obligation for you to participate, but we would appreciate it if you could offer your time. Is there anything else you'd like to know before you decide.

DEMOGRAPHIC

D1 What is your occupation? ______________________________

D2 How old are you. __________yrs ☐

D3 Could you tell me your height in feet_____and inches_______ 2

and your Weight how many stone _______lb________Kilos_______

D4 INTERVIEWER RECORD RESPONDENTS FRAME SIZE

Small.....1 Medium.....2 Large......3

D5 Gender Male ......1 Female ....2 ☐

D6 Town A.......... 1 B.......... 2 C .... 3 D 4 5

D7 How long have you lived at your present address____________

D8 Which letter best matches your highest level of schooling?

Q1 R2 S3 T4 U5 V6 W7 Card A

D9 Which one of these groups do you belong to? Maori 1

European.....2 Pacific Island 3

Other 4

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he next group of questions deals with where you drink alcohol.

1 Where did you get your supplies of beer, spirits, or wine from last year.

____

2 Where do you get your supplies of beer, wine, and spirits from now.

____

3 What day or days in the last week did you have a drink....1

in last fortnight ......2 in last Month...........3 D/K ..4

IF NOT HAD A DRINK IN LAST MONTH GO TO A7

today is ____/____/____	Mon	Tue	Wed	Thu	Fri	Sat	Sun
4 What Days did you have a drink	1	2	3	4	5	6	7
5 Where ....i - xiv							
i Own home (party)	1	2	3	4	5	6	7
ii Friends Home (not a	1	2	3	4	5	6	7
iii Party at friends place	1	2	3	4	5	6	7
iv Hotel (public Bar)	1	2	3	4	5	6	7
v Hotel (other Bar)	1	2	3	4	5	6	7
vi Workplace	1	2	3	4	5	6	7
vii Club: Name	1	2	3	4	5	6	7
viii Club: Name	1	2	3	4	5	6	7
ix Club: Name	1	2	3	4	5	6	7
x Restaurant/Hotel	1	2	3	4	5	6	7
xi Club/Sports club	1	2	3	4	5	6	7
xii Picnic/Barbecue/Boating	1	2	3	4	5	6	7
xiii In Car	1	2	3	4	5	6	7
xiv Marea: ______________	1	2	3	4	5	6	7
______________	1	2	3	4	5	6	7
xv Other: specify______________	1	2	3	4	5	6	7
______________	1	2	3	4	5	6	7

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A6 From this card could you please tell me what were your main reasons for drinking on (A2) .... Card B

Other ____

A7 When you were last drinking were you with

Spouse/Partner..............................1

Mixed group of male & females 2

Friends/workmates 3

Male friends/workmates 4

Members of family 5

No one else 6

A8 How many people (including yourself) were you drinking with

____

A9 Did you drive after drinking Yes .....1 No 2

For how long ________b

A10 When you last had a drink of beer, wine, or spirits what size drink did you have? (see photographs).

How much of the type of drink did you usally have

type	usual number

A11 Have you ever made homebrew?

Yes ......1 No.......2

If NO GO TO A16

12 How many bottles of beer, wine, or other drink do you homebrew now.

Bottles weekly_______1 monthly_______2 yearly________3

13 Have you increased....1, decreased.....2, or brewed the same amount .....3 in the last year.

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A14 How long ago did you begin brewing for your own consumption.

__________Years______________months ☐ 14 ☐

A15 Where do you buy your brew kits from now ______________________

A16 Do you have any comments about socialising and drinking ☐

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Now to change from alcohol to leisure activities. Here are list of leisure activities could you tell me how often you take part in them.

1 Almost every day 2 At least once a week

Card D 3 Less than once a week 4 Not often 5 Never

.1 Play a sport with others

.2 Play a sport alone

.3 Watch a live sport (not on television) 3

.4 Coach a sport

.5 Talk with friends outside work time

.6 Listen to the radio

.7 Play records, tapes, or compact disc 6

.8 Read a book, newspaper, or magazine

9 Learn or practice a musical instrument

10 Mind children 9

11 Watch a video

12 Go to a disco, dance, or pub to dance

13 Go to a party 12

14 Go out for a drink

15 Outdoor activities 15

16 what Other liesure activities ________________________________

____

____

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Next are a few questions that deal with alcohol also.

C1 How often would you have some kind of alcoholic drink?

(Don't show list below)

Once each day 1
2 - 3 times a week 2
About once a week 3
2 - 3 times each month 4
Less than once a month 5
Don"t know 6
Less then once a year 7
Other 9
Never Drink 10

C2 How long ago did you begin drinking, drinking regularly?

Less than a year ago 1
1 year ago but less than 2 years 2
2 years but less than 4 years 3
4 years but less than 6 years 4
6 years ago or more 5
Don't know 6

C3 How much each week would you spend on alcoholic drinks $______

C4 How sure are you that this amount is right Card E

Certain	Very sure	quite sure	not sure	unsure
1	2	3	4	5

C5 How often do you drink enough to get drunk

More than once per week.................1
Once per week 2
Once every 2 weeks 3
Once every 3/4 weeks 4
Once every 4 - 6 months 5
Once a year 6
Less than once per year 7
Never 8

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CONSENT FORM

1 016

Town No: Interview Number.

I have agreed to this interview

Signature ....

Date ____________________ Time ________________

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Appendix C

Police categories of offence codes

	Victim	Drugs	Property		Property		Traffic
1000 VIOLENCE	2000 SEXUAL	3000 DRUGS AND ANTI SOCIAL	4000 DISHONESTY	5000 PROPERTY DAMAGE	6000 PROPERTY ABUSE	7000 ADMINISTRATIVE	8000 TRAFFIC
1100 HOMICIDE	2100 SEXUAL ATTACKS	3100 DRUGS NOT CANNABIS	4100 BURGLARY ETC.	5100 DESTRUCTION OF PROPERTY	6100 TRESPASS	7100 AGAINST JUSTICE	Drink-Driving 8100 DRIVER CONDITION
1200 KIDNAPPING	2200 SEXUAL AFFRONTS	3200 DRUGS CANNABIS ONLY	4200 CAR CONVERSION ETC	5200 ENDANGERING	6200 LITTERING	7200 BIRTHS, DEATHS AND MARRIAGES	8200 MANNER OF DRIVING
1300 ROBBERY	2300 ABNORMAL SEX	3300 LIQUOR	4300 THEFT		6300 ANIMALS	7300 IMMIGRATION	8300 NON DRIVERS
1400 GRIEVOUS ASSAULTS	2400 IMMORAL BEHAVIOUR	3400 GAMING	4400 RECEIVING			7400 RACIAL	8400 VEHICLE
1500 SERIOUS ASSAULTS	2500 Indecent Videos	Antisocial 3500 DISORDER	4500 FRAUD		6500 POSTAL, RAIL AND FIRE SERVICE	7500 AGAINST NATIONAL INTEREST	
1600 MINOR ASSAULTS		3600 VAGRANCY				7600 BY-LAWS	
1700 INTIMIDATION AND THREATS		3700 FAMILY OFFENCES					
Group assemblies					6800 FIREARMS OFFENCES		

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Appendix D

Standardised alcohol beverage intake in grams of absolute alcohol

Estimation of alcohol intake in grams

Beer, standard (3.6% alcohol by vol, = 29 g/l)

1 flagon, = 2.25 l = 65 g of alcohol
1 jug, = 1.0 l = 29 g " "
1 bottle, = 750 ml = 22 g " "
1 small bottle, = 335 ml = 10 g " "
1 can (av), = 400 ml = 12 g " "
1 glass, = 200 ml = 6 g " "

Beer, export, (average 4.5% alcohol by vol, = 36 g/l)

1 small bottle, = 335 ml = 12 g of alcohol
1 can (av), = 400 ml = 14 g " "
1 glass, = 200 ml = 7 g " "

Spirits (max, 42% alcohol by vol, = 336 g/l)

1 bottle, = 750 ml = 252 g of alcohol
1 double nip = 40 ml = 13 g " "
1 single nip = 20 ml = 7 g " "

Port, sherry (18% alcohol by vol, = 144 g/l)

1 bottle, = 750 ml = 108 g of alcohol
1 glass, = 60 ml = 9 g " "

Table wine (11% alcohol by vol, = 88 g/l)

1 bottle, = 750 ml = 66 g of alcohol
1 glass, = 90 ml = 8 g " "

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